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SPREAD AND COMPARISION OF CHICKPEA VARIETIES (JG-11 AND JAKI-9218) IN DHARWAD DISTRICT OF KARNATAKA

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ABSTRACT

Chickpea (*Cicer arietinum* L.) is mainly a *rabi* season crop of India grown in diverse agroclimatic conditions under various cropping systems and a major pulse crop in Karnataka state. JG-11 and JAKI-9218 are two prominent chickpea varieties cultivated by farmers in Dharwad district along with Annigeri-1(local variety). The study throws light on differences between the above chickpea varieties in terms of spread, productivity and income. The study was conducted in Dharwad, Navalgund and Kundagol taluks of Dharwad district of Karnataka state during 2020-21 with a sample of 135 chickpea farmers. A distinctive pattern of spread of the two varieties*viz*., JG-11 and JAKI-9218 was noticed. Initially, in the year 2018-19, the area under JAKI-9218 was greater than JG-11, but in the subsequent years area under JG-11 became greater than JAKI-9218, mainly due to farmers preference to JG-11 variety for its better resistance to fusarium wilt. The study found that the productivity and income of JG-11 and JAKI-9218 varieties had a narrow difference but showed significant difference when compared with Annigeri-1(local variety).

Key words: Spread, Chickpea, Productivity, Income, Comparison, Varieties.

INTRODUCTION

Chickpea or Bengal gram or gram (*Cicer arietinum* L.) is one of the major pulse crops grown and consumed in India. Worldwide, chickpea is cultivated in an area of 14.97 million hectares with an annual production of 16.22 million tonnes with a productivity of 1252 kg/ha. India accounts for 68 per cent of the global area and 66 per cent of global production of chickpea, making India the leader in both area and production, but ranks 22nd in productivity (Anonymous, 2019). This issue of poor productivity could be resolved by harnessing the potential benefits of improved varieties(Kasa*et al,* 2021). In Karnataka, the most popular earliest desi cultivar cultivated by farmers is Annigeri-1(local variety). This cultivar thrived for many years in the absence of alternative improved varieties. In2007,the University of Agricultural Sciences (UAS) Dharwad implemented TL-IIproject in collaboration with ICRISAT, Patancheru, Andhra Pradesh, India. The project

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was implemented forthe identification of appropriate chickpeacultivars suitable forthe Dharwad region by initiating varietal trails on farmers'fieldsunderthe Farmers' Participatory Varietal Selection (FPVS) process by including the mostsuitable cultivars for the region. Under this project, two varieties were selected and found appropriate for the Dharwad region, among these one was JG-11, and another was JAKI-9218. (Manjushree, 2018).

JG-11 is a desi chickpea variety developed by Jawaharlal Nehru Krishi Vishwavidyalaya (JNKVV), Jabalpur, Madhya Pradesh, India in the year 1999 and possess attributes such as early maturity (95-100 days), high yield (up to 2.5t/ha in rainfed and up to 3.5t/ha in irrigated), attractive large seed (22g/100seeds) and high resistance to fusarium wilt (< 10% mortality)(Anonymous, 2008). Another desi chickpea variety JAKI-9218 developed by Dr. Panjabrao Deshmukh Krishi Vidyapeeth (PDKV), Akola, Maharashtra, India in the year 2006, carries a wide range of attributes such as average yield of 18-20 q/ha, early maturity (95-125 days), largebold seeds, seed size (20-27 g/100 seeds), with semi spreading and profuse branching, smooth surface, resistant to lodging shattering and resistant to diseases such as wilt, root rot and collar rot(http://dpd.gov.in/). Hence, by considering that these above two varieties will benefit many chickpea farmers, UAS, Dharwad and Karnataka State Seed Corporation (KSSC) has been taking a diligent role in seed production of these two chickpea varieties and made available for farmers to take up crop production. The present study aims to assess the spread and compare the chickpea varieties JG-11 and JAKI-9218 in Dharwad district.

MATERIAL AND METHODS

The study involved an "*ex-post-facto*" research, carried out in Dharwad district of Karnataka during 2020-21. Out of eight taluks, three taluks namely Navalgund, Dharwad, and Kundagol were purposively selected and from each taluk, three villages were selected based on the criteria of the maximum area under chickpea cultivation. In each selected village 15 chickpea farmers were selected throughsimple random sampling. Thus, 135 farmers constituted the sample for the study. A structured interview schedule was used to collect the primary data from chickpea farmers by personal interview method.The spread of varieties was studied based on secondary data obtained from the Karnataka State Department of Agriculture (KSDA), Karnataka State Seed Corporation (KSSC) and Raitha Samparka Kendra (RSK) of areas selected for the study.Productivity refers to the quantity of chickpea yield obtained per hectare. Income refers to the total income in rupees obtained by the farmerby cultivating chickpea crop. Income was worked out by using the following formula.

Gross returns = Average yield per hectareX Average market price per quintal

Net returns = Gross returns – Total cost of cultivation

RESULTS AND DISCUSSION

Spread of chickpea varieties JG-11 and JAKI-9218

The data presented in Table 1 and Table 2 gives a detailed account of the spread of JG-11 and JAKI-9218 variety, respectively in different taluks of Dharwad district from 2018-19 to 2020-21. The data presented in Table 3 depicts the

difference in percent area covered by the two varieties. In 2018-19, JAKI-9218 variety covered 30.73 per cent of the total chickpea area, while JG-11 variety occupied 17.73 per cent of the total chickpea area. In 2019-20 the area under JG-11 increased to 26.99 per cent of the total chickpea area, whereas the area under JAKI-9218 decreased by nearly a half to 16.60 per cent. In 2020-21 both the varieties showed a dip in area, where the area under JG-11 was 20.08 per cent and JAKI-9218 occupied 14.79 per cent of the total chickpea area during that year. Figure1 shows that though the area under JAKI-9218 in 2018-19 was nearly double the JG-11 area, there was a tremendous decrease in 2019-20 and 2020-21. But in the case of JG-11, the area increased in the year 2019-20 to 24,742.00 ha from 15,839.60 ha during 2018-19 but it decreased in the year 2020-21 to 18,255.20 ha.

Initially in 2018-19 farmers preferred JAKI-9218 as it was performing well during low moisture conditions in soil and possessed resistance to fusarium wilt.But farmers preference changed by the next *rabi* season 2019-20 as the JG-11 variety showed promising results with higher yield compared to JAKI-9218, with attractive large seeds and better resistance to fusarium wilt, hence area under JG-11 increased to 24,742.00 ha covering 26.99 per cent of total chickpea area. Simultaneously area under JAKI-9218 decreased to 16.60 per cent, this is due to farmer's favourable perception towards JG-11 and their experience of growing both the varieties led to an increase in area under JG-11 (Table 3). Similarly, the area under JAKI-9218 continued to decrease in the following year 2020-21 due to the above reasons. It was noticed that area under JG-11 had also decreased in the same year, the probable reasons are farmers preference of other crops like sorghum, wheat, onion *etc*., due to problems like labour shortage and unavailability of machinery for harvesting chickpea crop and farmers preference of cultivating Kabuli or white gram which fetcheda higher price than desi or brown gram. The results are in line with the findings of Shiyani *et al* (2002) and Shiferaw *et al* (2008).

Comparison of productivity and income of chickpea varieties

The results presented in Table 4 reveal that the average yield of JG-11 (15.68 q/ha) and JAKI-9218 (15.10 q/ha) chickpea variety was better than the local variety Annigeri-1 yield(10.58 q/ha). The average cost of cultivation for chickpea crop was Rs 25,351.56/ha in the case of JG-11 variety followed by Rs 25,081.44/ha for JAKI-9218 and Annigeri-1 with slightly lesser cost with Rs 22,210.31/ha. The net return was almost equal in the case of JAKI-9218 and JG-11 variety with Rs 49,171.20/ha and Rs 48,732.51/ha, respectively. But Annigeri-1 farmers received lesser net returns of Rs 31,263.90/ha. The benefit-cost ratio calculated for JG-11 and JAKI-9218 chickpea variety had a similar ratio with 1:1.92 and 1:1.96, respectively whereas for Annigeri-1 variety it was 1:1.41.

It is evident from Table 5 that there isa significant difference with respect to productivity, cost of cultivation and incomein JG-11 & Annigeri-1 and JAKI-9218 & Annigeri-1 variety at 1 per cent level. Whereas there is no significant difference between JG-11 & JAKI-9218 varieties.

JG-11 and JAKI-9218 varietiesare resistant to diseases such as fusarium wilt hence resulting in better yield. Whereas yield of Annigeri-1 is

lower compared to JG-11 and JAKI-9218 because Annigeri-1 is a local varietywith low-quality seeds and is susceptible to diseases such as fusarium wilt and rust. In the case of income, farmers of JG-11 and JAKI-9218 are getting higher income because the produce is fetching good prices for their bigger and better-quality grains in the market compared to Annigeri-1 grains are smaller in size, hence they attract lesser price per quintal. The present findings get the confirmation from results of Rimal *et al* (2015)

Feedback from farmers about chickpea varieties

An appraisal of Table 6 reflects various feedback given by farmers about chickpea varieties.

Yield

With respect to the yield of the varieties more than half of JG-11 (66.67 %) farmers, 55.56 per cent of JAKI-9218farmers and only 8.89 per cent of Annigeri-1 farmers expressed that they are satisfied with the yield level. Whereas the majority of Annigeri (91.11 %) farmers, thereon JAKI-9218 (33.33 %) and JG-11 (26.67 %) reported that yield has been reduced over the years.

Regarding JG-11 variety, the majority of the farmers were getting higher yield (6 to 8 q/ acre) compared to other varieties hence they were satisfied with the yield, only one-fourth of the JG-11 farmers expressed that yield reduced over the years this might be due to poor adoption of recommended package of practices. Similarly, with respect to JAKI-9218 more than half of the farmers were satisfied with the yield (6 to 7 q/ acre). One-third of the JAKI-9218 farmers expressed that yield reduced over the years. This might also be due to the low adoption of recommended package of practices. In the case of Annigeri-1, more than 90 per cent of farmers expressed yield reduced over the years, this might be due to higher susceptibility to diseases such as fusarium wilt & rust as well as the seeds sown were of low quality.

Cost of Seeds

Three-fourth of JAKI-9218 farmers (75.56 %) and nearly 70 per cent of JG-11 farmers(68.89 %) farmers expressed that the cost of seeds was affordableas the farmers received a subsidy for the seeds from the RSK.Majority of Annigeri-1 farmers were also comfortable with the price of the seeds as they usually buy it from neighbouring farmers for a cheaper price than in the market or save seeds from the previous harvest.One-third of JG-11 (31.11 %) farmers and 24.44 per cent of JAKI-9218expressed that the cost of seeds was on a higher side as they were excepting to get a better subsidy rate and also felt that lowering the cost of the seeds would help to reduce the cost of cultivation.

Access / Availability of seeds

With respect to the availability of seeds majority of Annigeri-1 farmers (95.56 %) then JAKI-9218 (88.89 %) and JG-11 (75.56 %) reported that they had adequate and timely access to seeds, whereas 24.44 per cent of JG-11 farmers, 11.11 per cent of JAKI-9218 and only 4.44 per cent of Annigeri-1 farmers faced non-availability of seeds in time.

Nearly 90 per cent of JAKI-9218 and three-fourth of JG-11 farmers had adequate and timely access to seeds as there was sufficient and timely availability of seeds to the RSK, andthe majority

(95.56 %) of Annigeri-1 had adequate access to seeds as they use seeds from the previous harvest or buy seeds from nieghbouring farmers within the village or nearby villages.Nearly one-fourth of JG-11 and only one-tenth of JAKI-9218 farmers faced a problem of non-availability of seeds in time due to overcrowding of farmers at the RSK for availing the seeds.

Pest and disease resistance

The equal number of farmers of JG-11 and JAKI-9218 (*i.e*., 15.56 %) and only 2.22 per cent of Annigeri-1 farmersexpressed that the varieties adopted have no problem with both pest and diseases.This might be due tothe adoption of recommended dosage of pesticides and practices for controlling pests and diseases. The majority of Annigeri-1 (88.89 %) and an equal number of JG-11 and JAKI-9218 (*i.e*., 60.00 %) farmers reported that the variety is susceptible to fusarium wilt, this might be due to low adoption of recommended package of practices by farmers. Nearly 90 per cent of Annigeri-1 farmers faced the problem of fusarium wilt as they were not following seed treatment with Trichoderma which helps to control fusarium wilt.More than half of JAKI-9218 (55.56 %) followed by Annigeri-1 (48.89 %) and JG-11 (37.78 %) reported that the variety is susceptible to rust disease. This might be due to the presence of congenial conditions for pests such as low temperature, high relative humidity, improper field sanitation measures,*etc*.

Improvements required / Expectations

With respect to improvements required in the variety, more than half of JG-11 farmers (62.22 %), subsequently 46.67 per cent of JAKI-9218 and only 13.33 per cent of Annigeri -1 farmers expressed that they require chickpea crop with better or increased height so that it would be convenient for taking up mechanical harvesting, as there is a problem of shortage of labour and higher cost of manual harvest.

The majority of Annigeri-1 (93.33 %) followed by JAKI-9218 (62.22 %) and JG-11 (48.89 %) revealed that they require varieties with higher yield than the present adopted varieties as they are not satisfied with the present yield level of the varieties currently cultivated. Similarly, 95.56 per cent of Annigeri-1 farmers followed by JG-11 farmers (80.00 %) and JAKI-9218 farmers (77.78 %) expressed that they require varieties with improved pests and disease resistanceso that they could cut short the expenses on costly pesticides and other chemicals to control pests and diseases.Also, more than one-third (37.78 %) of Annigeri-1,17.78 per cent of JAKI-9218and 15.56 per cent of JG-11 farmers suggested that timely advisory service or demonstrations regarding the improved varieties are essentialso that the farmers could get confidence and timely information to adopt the new varieties and recommended package of practices for chickpea.

CONCLUSION

The improved varieties JG-11 and JAKI-9218 were found to be superior to Annigeri-1 (local variety), both in terms of productivity and income. It is fundamental that a variety with favourable attributes is essential for a farmer to enjoy a higher yield and successively earn better income from the crop.The feedback given by chickpea farmers regarding the varieties indicated that a good majority of JG-11 and JAKI-9218 farmers faced the problem of susceptibility

Table 1: Spread of JG-11 variety in Dharwad district of Karnataka

Sl. No.	Taluks	2018-19		2019-20		2020-21	
		Seed Sale quantity (q)	Area (ha)	Seed Sale quantity (q)	Area (ha)	Seed Sale quantity (q)	Area (ha)
1	Dharwad	3203.60	6407.20	4811.40	9622.80	2839.60	5679.20
2	Hubballi	1799.40	3598.80	2347.80	4695.60	1902.00	3804.00
3	Kalaghatagi	50.00	100.00	215.00	430.00	69.20	138.40
4	Kundagol	529.40	1058.80	2112.40	4224.80	1186.00	2372.00
5	Navalagund	2337.40	4674.80	2884.40	5768.80	3130.80	6261.60
	Total	7919.80	15839.60	12371.00	24742.00	9127.60	18255.20

Table 2: Spread of JAKI-9218 variety in Dharwad district of Karnataka

Sl. No.	Taluks	2018-19		2019-20		2020-21	
		Seed sale quantity (q)	Area (ha)	Seed sale quantity (q)	Area (ha)	Seed sale quantity (q)	Area (ha)
1	Dharwad	6871.20	13742.40	4064.40	8128.80	3604.40	7208.80
2	Hubballi	1129.40	2258.80	897.80	1795.60	749.80	1499.60
3	Kalaghatagi	285.00	570.00	90.00	180.00	52.00	104.00
4	Kundagol	1974.60	3949.20	1093.80	2187.60	670.20	1340.40
5	Navalagund	3467.80	6935.60	1464.60	2929.20	1648.40	3296.80
	Total	13728.00	27456.00	7610.60	15221.20	6724.80	13449.60

Table 3: Comparison of the spread of the varieties

Sl.No	Year	Total area under chickpea (ha)	Area under (ha)		% Area covered	
			JG-11	JAKI-9218	JG-11	JAKI-9218
1	2018-19	89,355.69	15,839.60	27,456.00	17.73	30.73
2	2019-20	91667.00	24,742.00	15,221.20	26.99	16.60
3	2020-21	90933.00	18,255.20	13,449.60	20.08	14.79

to fusarium wilt and rust disease. The distinctive pattern of spread of two varieties JG-11 and JAKI-9218 calls for efforts by extension agencies to intervene and contact chickpea farmers and take necessary measures to motivate the farmers in adoption and avoid discontinuation of adoption of improved varieties.Therefore,it is necessary to conduct training programmes and demonstrations for farmers in their villages focusing on recommended practices for the control of such diseases.With regard to improvements required or expectations,the majority of JG-11 and JAKI-9218 farmers expressed that they require chickpea crop with an increased height suitable for mechanical harvesting. Hence, research efforts are needed to develop a chickpea variety with better height than the already existing varieties to facilitate the farmers to go for mechanical harvesting.

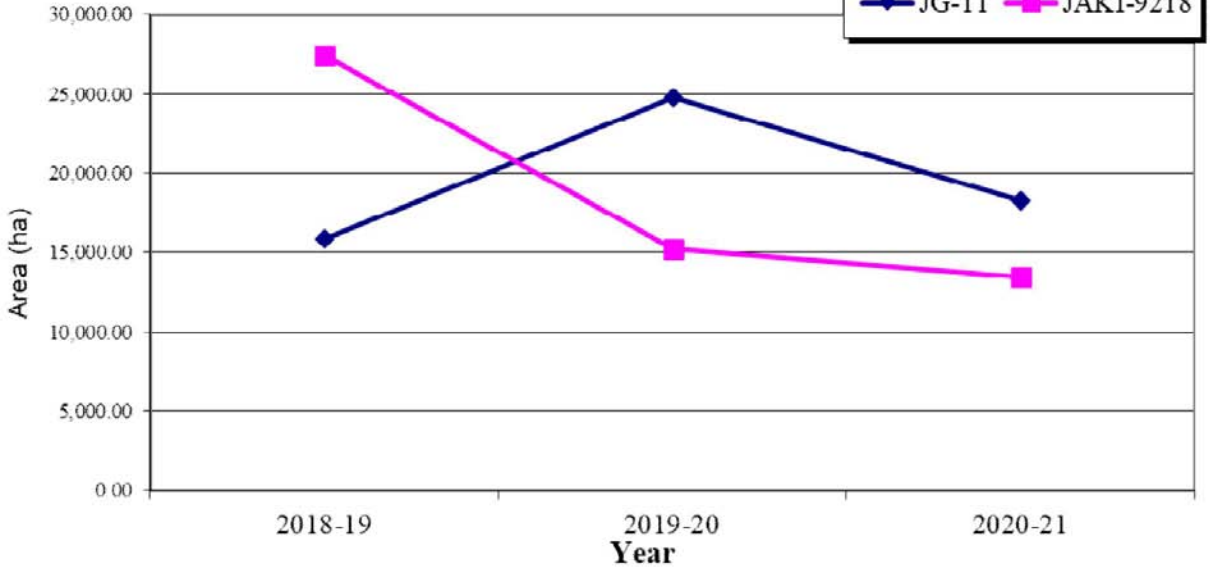

Fig. 1 : Comparison of the spread of the varieties

Table 4 : Impact of chickpea varities on productivity and income of farmers

n = 135

Sl. No.	Particulars	Varieties		
		JG-11	JAKI-9218	Annigeri-1
1.	Average Yield (q/ha)	15.68	15.10	10.58
2.	Gross cost (Rs/ha)	25,351.56	25,081.44	22210.31
3.	Gross return (Rs/ha)	74,084.07	74,252.67	53,474.21
4.	Net return (Rs/ha)	48,732.51	49,171.20	31,263.90
5.	B:C ratio	**1.92**	**1.96**	**1.41**

Table 5 : Difference between the varities in terms of productivity and income

Sl. No.	Particulars	JG11 vs JAKI 9218	JG11 vs Annigeri 1	JAKI 9218 vs Annigeri 1
		t- value	t-value	t-value
1	Average Yield	0.81^{NS}	8.37**	8.60**
2	Cost of cultivation	0.63^{NS}	7.55**	6.45**
3	Net returns	0.15^{NS}	7.58**	8.62**

** - Significant at 1 per cent * - Significant at 5 per cent ^{NS} - Non-significant

Table 6: Distribution of chickpea farmers according to their feedback about chickpea varieties

n= 135

Sl. No	Feedback	JG-11 Farmers n_1=45		JAKI-9218 Farmers n_2=45		Annigeri-1 Farmers n_3=45		Total n=135	
		f	%	f	%	f	%	f	%
A.	**Yield**								
a.	Satisfied with the yield	30	66.67	25	55.56	4	8.89	59	43.70
b.	Yield has reduced over the years	12	26.67	15	33.33	41	91.11	68	50.37
B.	**Cost of Seeds**								
a.	Affordable	31	68.89	34	75.56	43	95.56	108	80.00
b.	Costly/ High cost of seeds	14	31.11	11	24.44	2	4.44	27	20.00
C.	**Access/Availability of seeds**								
a.	Adequate and timely access	34	75.56	40	88.89	43	95.56	117	86.67
b.	Non availability of seeds in time	11	24.44	5	11.11	2	4.44	18	13.33
D.	**Pest and disease resistance**								
a.	No problem of both pest and diseases	7	15.56	7	15.56	1	2.22	15	11.11
b.	Susceptible to fusarium wilt	27	60.00	27	60.00	40	88.89	94	69.63
c.	Susceptible to rust	17	37.78	25	55.56	22	48.89	64	47.41
E.	**Improvements required / Expectations**								
a.	Increased crop height for mechanical harvest	28	62.22	21	46.67	6	13.33	55	40.74
b.	Varieties possessing higher yield	22	48.89	28	62.22	42	93.33	92	68.15
c.	Improved pest and disease resistance	36	80.00	35	77.78	43	95.56	114	84.44
d.	Timely advisory service / Demonstrations regarding improved varieties	7	15.56	8	17.78	17	37.78	32	23.70

Note: f= Frequency, %= Percentage

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KNOWLEDGE LEVEL OF FARMERS ON AGRO-MET ADVISORY SERVICES IN HARYANA

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ABSTRACT

The weather has the biggest impact on agricultural productivity. Climate is commonly characterized as regular weather, or more precisely, as the statistical explanation of important parameters in mean and variability relationships over time scales ranging from months to thousands or millions of years. India's agriculture, like that of the rest of the globe, is mostly dependent on the weather. Agriculture and its yield have been significantly impacted by global warming. Rising temperatures have increased the shift in growing seasons and changes in agricultural zones. Changes in rainfall patterns, on the other hand, represent a serious threat to agriculture, negatively impacting the economy and food security of the country. The delayed or insufficient monsoons also hinder the sale of agricultural items such as fertilizers, agrochemicals, and tractors. As a result, the farmer's earnings are harmed.

Key words: Agro-met Advisory Services, Climate change, and Agriculture

INTRODUCTION

In order to improve the country's food security, the Indian government has focused on improving farmers' awareness of sustainable farming practices. Despite excellent agricultural research and technologies, Indian farmers confront a slew of challenges in maintaining crop yield. Many of these issues are tied to weather and climate changes. To properly address this issue, the government established the District-level Agro-meteorological Advisory Service (DAAS) in June 2008 as one of the Ministry of Earth Sciences' flagship programmes. The DAAS seeks to build a suitable dissemination system for agro-meteorological information (weather forecasts and agro-met advisories) to the farming community in order to boost crop/ livestock productivity. It allows farmers to take advantage of favourable weather while minimizing the negative effects of unfavourable weather on crops. Weather-based agro-advisories are currently distributed to the farming community at the district level via mass media (Radio, Print and TV). However, there is a significant information gap between the information generator and the user. The IAAS system's outreach to supply timely information at the Block and Panchayat (village) level needs

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to be increased up. The Department of Information Technology's Common Service Centre (CSC) is a good solution for bridging the information gap by leveraging developments in information technology (IT), which has seen gradual application in information distribution in recent years.

The DAAS is a multi-institutional and multi-disciplinary project. State Agricultural Universities (SAUs), the Indian Council for Agriculture Research (ICAR), Krishi Vigyan Kendras (KVK), the Department of Agriculture and Cooperation, State Departments of Agriculture/ Horticulture/ Animal Husbandry/ Forestry (up to District level offices), NGOs, Media Agencies, and other collaborator are all involved. To set up distinct components of the service spectrum, a five-tier structure is being used to implement this project. It includes meteorological (weather observing and forecasting), agricultural (identifying weather-sensitive stress and preparing appropriate advisories using weather forecasts), extension (two-way communication with users), and information dissemination (media, information technology, and telecommunications) agencies. Weather Observing System, Weather Forecasting System, Agro-meteorological Field Units (AMFUs), and Agro-advisory are essential components of the DAAS system. Because weather is such an important role in agriculture, crop development and yield are influenced by the current weather conditions in the area. Advance weather forecasting (3-5 days) allows for effective resource management in agricultural activities, reducing risk and facilitating growth and achieving the best crop yield possible. In Finger millet, Redgram, Field bean, and Tomato crops, farmers that used the Agro-met Advisories in their daily operations had an average additional benefit of 31.45 percent, 24.65 percent, 16.20 percent, and 20.56 percent, respectively. This clearly demonstrated that the Agro-met recommendation can improve crop output. As a result, the farming community must expand and adopt this in order to achieve increased food production.

The Intergovernmental Panel on Climate Change (IPCC) estimates that global mean temperatures will be between 1.4 and 5.8 degrees Celsius higher by 2100 than they were in 1990. This is a significant rate of warming. In the tropics, major variations in precipitation, both increases and declines, are expected. Weather phenomena such as storms and floods are anticipated to turn out to be more frequent and intense as a result of climate change. The melting of mountain glaciers and the ocean's thermal expansion will both contribute to a rise in sea level as a result of climate change. By 2100, the global mean sea level is expected to rise by 15 to 95 Centi Metres (IPCC 2001).The greater the risk of environmental damage, the faster the climate changes. Many ecosystems may deteriorate or fracture, resulting in the extinction of particular species. If GHG emissions continue at their current rate, hunger and disease will increase, and water resources will be further stressed, according to predictions. Extreme weather events such as heavy rains, storms, droughts, floods, and sea level increase are also expected to become more common and last longer, according to scientists. Due to the melting of polar ice caps and thermal expansion of sea water, the upper layers of the oceans warm as the earth's atmosphere warms.

OBJECTIVES

Knowledge level farmers on climate change and constraints undergo by the farmers in adopting recommended mitigation strategies.

MATERIAL AND METHODS

The study was showed in Hisar district, Haryana state. Hisar station lies at latitude of 29°10'N and longitude of 75°46'E and an altitude of 215.2 m above mean sea level. In present investigation, Ex-post facto research design was used. This design was considered appropriate, since it is systematic empirical enquiry, for measuring the occurrence that has already happened and continues to happen.

Knowledge is the process of gathering, retrieving, and recognizing information. For the aim of the study, the operational degree for quantifying climate change knowledge was created by developing a teacher-made test, as described by Anastasi (1961).

An opinion poll was created based on the statements made about climate change. There was a total of six questions created. These were the knowledge statements that were asked. The respondents were given the knowledge exam that had been prepared.

The farmers knowledge items were quantified by assigning a score of one for accurate answers and zero for incorrect answers on each item. The knowledge score of the respondents was calculated by adding the scores of all the separate items that were answered correctly by the farmers. In the occasion of agro-met advice service farmers and other farmers, the maximum score a respondent can receive is 6.Using the formula, each farmers raw knowledge score was turned into a knowledge index:

$$\text{Knowledge index} = \frac{\text{Number of correct responses}}{\text{Total number of knowledge items}} \times 100$$

Respondents were alienated into low, medium, and high knowledge levels based on their total score, using mean and standard deviation as a measure of check.

Table 1. Knowledge level of Agro-met advisory service of beneficiary farmers and other farmers

Category	Criteria
Low	<(Mean - 0.425*SD)
Medium	(Mean ± 0.425*SD)
High	>(Mean + 0.425*SD)

The schedule was established to determine the constraints faced by the Agro-met advice service farmers in implementing the proposed strategies, and they were asked to mark the severity of their responses to each question as more severe, severe, or less severe. The data was tabulated using the percentage and ranks order.

RESULTS AND DISCUSSION

To acquire a better understanding of the specifics of knowledge concerning components of climate change, the respondents were separated into two groups: those who had right and those who have wrong knowledge.

The results table 1 indicated that (87.78 %) beneficiary farmers and 32.22 per cent of non-beneficiary farmers were known about SMS facilities (e-Mausam) provided by CCSHAU, Hisar. 93.33 per cent of beneficiary farmers and 13.33

Table 2. Knowledge level of beneficiary farmers on climate change in Agro-met Advisory Services

Sl. No.	Knowledge items	AAS farmers (90)	
		F	%
A	**Agro-Met Advisory Services**		
1	Do you know about SMS facilities (e-Mausam) provided by CCSHAU	79	87.78
2	Healthier seasonal crop management is conceivable due to Agro-Met advisory services	84	93.33
3	Farmer can swing the cropping pattern with the help of AAS	78	86.67
4	Agro-Met advisory services improves the social relationship of the farmers	61	67.78
5	AAS helps farmers in effective planning of plant protection measures	71	78.89
6	Day to day farm operation like sowing, harvesting, marketing etc. can be achieved well on time with the help of technical management on weather	80	88.89
Average		**75**	**83.33**

Table 2. Knowledge level of non-beneficiary farmers on climate change in Agro-met Advisory Services

Sl. No.	Knowledge items	Non-AAS farmers (90)	
		F	%
A	**Agro-Met Advisory Services**		
1	Do you know about SMS facilities (e-Mausam) provided by CCSHAU	29	32.22
2	Healthier seasonal crop management is conceivable due to Agro-Met advisory services	12	13.33
3	Farmer can swing the cropping pattern with the help of AAS	28	31.11
4	Agro-Met advisory services improves the social relationship of the farmers	7	7.78
5	AAS helps farmers in effective planning of plant protection measures	24	26.67
6	Day to day farm operation like sowing, harvesting, marketing etc. can be achieved well on time with the help of technical management on weather	29	32.22
Average		**21**	**23.33**

Table 3: Distribution of farmers according to their knowledge on Agro-met Advisory Services

Sl. No.	Category	AAS farmers		Non-AAS farmers	
		Frequency	Percentage	Frequency	Percentage
1	Low	11	12.22	61	67.78
2	Medium	35	38.89	16	17.78
3	High	44	48.89	13	14.44

per cent of non-beneficiary farmers known healthier seasonal crop management is possible due to Agro-met Advisory Services. 86.67 per cent of beneficiary farmers and 31.11 per cent of non beneficiary farmers can change the cropping pattern with the help of Agro-met Advisory Services. 67.78 percent of beneficiary farmers and 7.78 percent of non-beneficiary farmers improve the social relationship with the help of Agro-met Advisory Services. 78.89 percent of beneficiary farmers and 26.67 percent of non-beneficiary farmers had effective planning of plant protection measures by Agro-met Advisory Services. 88.89 percent of beneficiary farmers and 32.22 percent (Table 2) of non-beneficiary farmers benefited the day to day farm operation like sowing, harvesting, marketing etc. can be performed well on time with the help of technical direction on weather. Statements wise overall knowledge level on Agro-met Advisory Services is (83.33 %) beneficiary farmers and (23.33%) for non beneficiary farmers respectively.

The data in Table 2 reveals that (48.89 %) beneficiary farmers had more knowledge level on Agro-met Advisory Services followed by 38.89 per cent and 12.22 per cent had medium and low knowledge level on Agro-met Advisory Services respectively. whereas 67.76 per cent of non-beneficiary farmers had low knowledge level on Agro-met Advisory Services followed by 17.78 per cent of non beneficiary farmers had medium knowledge level on Agro-met Advisory Services and 14.44 per cent of non beneficiary farmers had low knowledge level on Agro-met Advisory Services had high knowledge level. Climate is the main cause of agricultural productivity.

Crop and livestock productivity, as well as hydrologic balances, input availability, and other agricultural system components, are expected to be impacted by climate change. Crop productivity will be lowered as a result of climate change, and farmers economic conditions will be impacted. As a result, determining the level of knowledge among farmers is critical. This indicates that beneficiary farmers were more knowledgeable about climate change than non beneficiary farmers. As compared to non beneficiary farmers, we can see a substantial difference in knowledge levels because beneficiary farmers receive ideas from professionals and weekly Agro-met Advisory Services bulletins offering suitable climate change information aid to enhance their knowledge.

Hence, the hypothesis set for the research that there would be no difference in knowledge about climate change among Agro-met Advisory Services and non Agro-met Advisory Services farmers was excluded. These results are in traditionalism with the studies of Dunlaps (1998), Stamm *et al*., (2000) and Ryo Sakuraj *et al*., (2011).

The constraints handled by farmers were mentioned in Table 4 and are displayed. Farmers must play a vital part in overcoming the negative effects of climate change and its consequences on agriculture by implementing a variety of alternative crop production practices. This is a crucial step in stabilizing and sustaining their lives. In such conditions, farmers faced numerous challenges or limits in implementing recommended adaptation measures to mitigate the negative consequences of climate change.

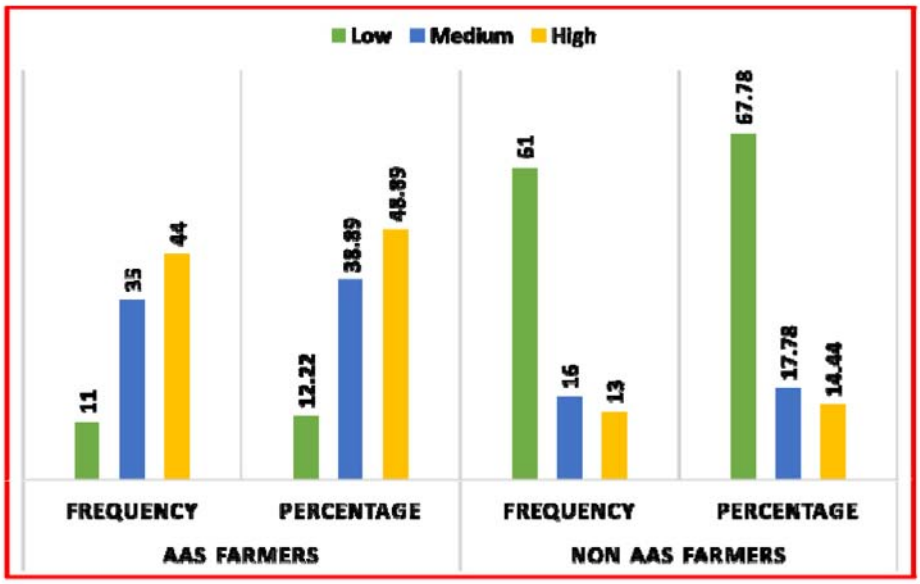

Fig.1. Distribution of farmers according to their knowledge level on agro-met Advisory Services

The data in the table 4 revealed that, major constraints faced by farmers to take up recommended adoption measures to overwhelmed ill effects of climate change were, lack of technical skills and capacities for technologies adoption(Rank 1), lack of understanding and sensitivity to the creation and application of new technologies (Rank 2), inputs are not available in a timely manner (Rank 3), lack of information about long-term climate change (Rank 4), higher costs in adoption of technology (Rank 5), lack of extension services in dissemination of technology (Rank 6) and lack of venture capital and land tenure issues (Rank 7).The likely causes for this are that farming has been done on a small scale in recent years, with limited per capita land availability, a low income group, and a lack of cosmopoliteness. Adapting

Table 4. Constraints undergo by beneficiary farmers.

Sl. No.	Constraints	Score	Per cent (%)	Rank
1	Higher costs in adoption of technology.	136	75.56	V
2	Lack of venture capital and land tenure issues	87	48.33	VII
3	Inputs are not available in a timely manner (Seeds, chemicals and pesticides)	156	86.67	III
4	Lack of understanding and sensitivity to the creation and application of new technologies.	157	87.22	II
5	Lack of extension services in dissemination of technology	125	69.44	VI
6	Lack of technical skills and capacities for adoption of technologies	171	95	I
7	Lack of information about long term climate change	145	80.56	IV

appropriate technologies in their field is quite tough for them. We can deduct from this those farmers are having difficulty implementing mitigating strategies.

CONCLUSION

The majority of beneficiary farmers had 48.89 per cent more knowledge level on Agro-met Advisory Services followed by 38.89 percent had medium and 12.22 percent had low knowledge level on Agro-met Advisory Services respectively. whereas majority of non-beneficiary farmers had 67.76 percent of low knowledge level on Agro-met Advisory Services followed by 17.78 percent of non-beneficiary farmers had medium knowledge level on Agro-met Advisory Services and 14.44 percent of non beneficiary farmers had less knowledge level on Agro-met Advisory Services had high knowledge level.

Lack of technical skills and capacities for adoption of technology, lack of understanding and sensitivity about the creation and application of new technologies, Inputs are not available in a timely manner, and lack of information about long-term mitigation strategies were the major constraints faced by respondents in taking up the recommended mitigation strategies to overcome the ill effects of climate change, in order of their rank.

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ADOPTION PATTERN OF 448 VARIETIES OF TOMATO AMONG THE FARMERS OF ANANTHAPURAMU DISTRICT

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ABSTRACT

Andhra Pradesh is one of the major tomato producing states in the country. The present study was conducted to identify the adoption pattern of 448 variety of tomato in Ananthapuramu district of Andhra Pradesh which was released by IIHR, Bangalore. The study also includes identification of the major factors for adoption and find out the major attributes of innovation that led to the adoption of 448 variety. An *ex-post facto* research design was adopted for the study. The study included 40 respondents chosen by purposive sampling method. Data was collected with the help of well-structured interview schedule through telephonic interview due to COVID-19 pandemic. The statistical tools used for analysis are mean, standard deviation, cumulative frequency and percentage analysis. Profile characters of the respondents viz., age, educational status, occupation, farm size, farming experience, annual income, frequency of exposure to agricultural messages, scientific orientation and cropping pattern were studied. Based on the mean and SD values the respondents were classified into adopter categories. The results of the adopter categorization showed that two-fifths (40.00 %) of respondents belonged to early majority and only 5.00 percent were innovators. Among the factors affecting adoption of 448 variety of tomato, majority (80.00 %) adopted due to their own interest and with the influence of friends and neighbours. Compatibility (95.00 %) and observability (82.50 %) of the variety played an important role among the attributes of innovation for the adoption of 448 variety of tomato among the respondents.

Key words: Adoption pattern; Attributes; Factors; Innovation; Profile.

INTRODUCTION

Agriculture sector encounters enormous hurdles both locally and globally due to changing economic and environment goals. In this backdrop, agricultural innovations can boost the output while protecting the environment. Farmers require technologies that will boost efficiency and provide a comparative benefit at the farm level (Sumberg, 2005).To meet the world's consumption demand, agricultural production must increase by 60% by 2050 (Alexandratos and Bruinsma, 2012). Since the so-called green revolution, agricultural research investments have resulted in the development and release

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of many improved crop varieties (ICV) for cultivation by farmers all over the world [CGIAR], 2011).

The use of improved crop varieties promotes the development of agro-processing enterprises and non-farm sectors, as well as the shift from low productivity subsistence farming to a highly productive industrial economy (Just and Zilberman, 1988). Furthermore, developing and promoting the adoption of improved crop varieties in a financially viable manner aids improvement of livelihood of rural farmers (Asfaw et al, 2012). Commercialization and adoption of new technologies and varieties has been a difficult task and impossible on many grounds due to the fact that majority of the farmers in India are small and marginal farmers. This impedes the expansion of production, income generation and enhancement of livelihoods. Gauchan *et al*., (2012) stated that farmers divide the farm land into plots and subplots and grow varieties of their own choice. Therefore, farmers' perceptions of new varieties are particularly important in determining which variety they will adopt (Sall et al, 2000).Also, farmers' views of crop variety technology-specific characteristics are critical factors in affecting adoption and use intensity. (Adesina and Zinnah, 1993).

Rogers (1962) noted five attributes of a good technology as follows; relative advantage, compatibility, complexity, observability and trialability. That is to say that the innovation should not only be seen, it should be easy to understand and adopt. It should also be consistent with the farming practices already adopted by the farmer. Furthermore, the farmer should be able to experiment the new technology to know for him/ herself its usefulness and viability. However, despite some promising attributes of the technology, some people may not adopt it. The reasons are varying; some may not be aware of it, others may not have the means to access it, and some would still have some misgivings about the technology. Whatever, the reason, however, they would also have made a choice.

Andhra Pradesh is one of the major tomato producing states in the country. Ananthapuramu occupies third position in area under tomato production following Chittoor and Kurnool. In spite of being one among the largest areas, the crop showed low productivity (6193 kg/ha) in the district (Season and crop report, 2012). In this context, the present study was focused on profile of farmers growing 448 variety, an improved varietyof tomato released by IIHR, Bangalore in 2010. The study included the factors affecting adoption of the improved variety and attributes of innovation that contributed for adoption.

MATERIALS AND METHODS

Ananthapuramu district in Andhra Pradesh was purposively selected for the study. The study was conducted during the COVID 19 pandemic. Secondary data on farmers growing the 448 variety of tomato was collected from Department of Agriculture, Atmakuru block of the district. A sample of 40 was selected randomly based on the secondary data. Data collection was done through telephonic interview due to the existence of pandemic situation. Collected data was analysed using descriptive statistics of mean, standard deviation, cumulative frequency and percentage analysis. Mean and standard deviation were used for categorizing the respondents into adopter categories and cumulative frequency method was used for depicting the innovation S- curve.

RESULTS AND DISCUSSION

PROFILE OF RESPONDENTS

The data on profile of the respondents was collected, analysed and presented in Table 01.

Table 01. Profile of respondents

S. No.	Characteristics	Category	Frequency	Percentage
1.	Age	Young(Up to 35 years)	13	32.50
		Middle(36-45 years)	14	35.00
		Old(Above 45 years)	13	32.50
		Total	40	100.00
2.	Educational status	Illiterate	5	12.50
		Functionally literate	7	17.50
		Primary education	11	27.50
		Middle education	3	7.50
		Secondary education	5	12.50
		Higher secondary education	7	17.50
		Collegiate education	2	5.00
		Total	40	100.00
3.	Occupational status	Agriculture as Primary Occupation	35	87.50
		Agriculture as Secondary Occupation	5	12.50
		Total	40	100.00
4.	Annual income	< 1,00,000	5	12.50
		1,00,001 - 2,00,000	14	35.00
		2,00,001 – 4,00,000	17	42.50
		4,00,001 - 8,00,000	4	10.00
		> 8,00,000	-	-
		Total	40	100.00
5.	Farm size	Marginal (<1ha)	4	10.00
		Small (1-2ha)	21	52.50
		Others (>2 ha)	15	37.50
		Total	40	100.00
6.	Farming experience	Up to 10	14	35.00
		11-20	16	40.00
		21-30	10	25.00
		Total	40	100.00
7.	Frequency of exposure to Agricultural Messages	Low (9-14)	14	35.00
		Medium (15-20)	15	37.50
		High (21-27)	11	27.50
		Total	40	100.00
8.	Scientific Orientation	Low (6-17 scores)	7	17.50
		Medium (18-29 scores)	25	62.50
		High (30-42 scores)	8	20.00
		Total	40	100.00
9.	Formal sources of information	Low (7-11 scores)	11	27.50
		Medium (12-16 scores)	16	40.00
		High (17-21 scores)	13	32.50
		Total	40	100.00
10.	Informal sources of information	Low (6-9 scores)	-	-
		Medium (10-13 scores)	29	72.50
		High (14-18 scores)	11	27.50
		Total	40	100.00

From Table 1 respondents' distribution is almost equal among all the age groups. Respondents with primary education are more in number(27.50%) when compared to other education categories. Among the respondents, majority (87.50%) are having agriculture as their primary occupation. Number of respondents are more than half (52.50%) under small farmer category, followed by the farmers with more than 2ha(37.50%).

Exactly two-fifths (40.00 %) of respondents are with an experience of 11-20 years in farming and 35.00 percent with an experience of up to 10 years and 25.00 percent with 21-30 years of experience.

More than two- fifths (42.50 %) of the respondents are with an annual income between Rs. 2L to Rs. 4L and 35.00 percent respondents with Rs. 1L to Rs. 2L. Only 10.00 percent are earning Rs. 4L to Rs. 8L and 12.50 per cent are with an income of less than Rs. 1L.

More than one-thirds (37.50%) respondents are with a medium frequency of exposure to agricultural messages and 35.00 per cent are with a low frequency. 27.50 percent of respondents are having high frequency of exposure to agricultural messages.

Nearly two-thirds (62.50%) of the respondents are having medium level of scientific orientation. 20.00 per cent of the respondents are having high level of scientific orientation and 17.50 per cent are with low level of scientific orientation.

Exactly two-fifths (40.00 %) of the respondents are receiving a medium level of information from formal sources. The respondents with high and low level of information from formal sources are 32.50 and 27.50 per cent respectively. Nearly three-fourths (72.50%) of the respondents are receiving a medium level of information from the informal sources like friends and relatives, input dealers, neighboring farmers etc.

Adopter Categorization of Respondents

Earliness of an individual in adopting a new idea or technology is referred as innovativeness. The data on year of adopting the variety since its introduction in 2010 was collected. The data was analyzed using mean and standard deviation. The respondents were categorized into adopter categories based on innovativeness and presented in Table 03 and depicted in Fig. 01.

Table 03. Adopter categorization of respondents based on year of adoption of variety

Adopter Categories	Formula	Value Obtained	Cut Off Year	No. of Respondents	Percentage
Innovators	Mean-2 SD	2009.911	2010	2	5.00
Early adopters	Mean-1Sd	2012.318	2012	6	15.00
Early majority	Mean	2014.725	2015	16	40.00
Late majority	Mean+1SD	2017.132	2017	12	30.00
Laggards			2020	4	10.00
Mean: **2014.725** Standard deviation: **2.41**					

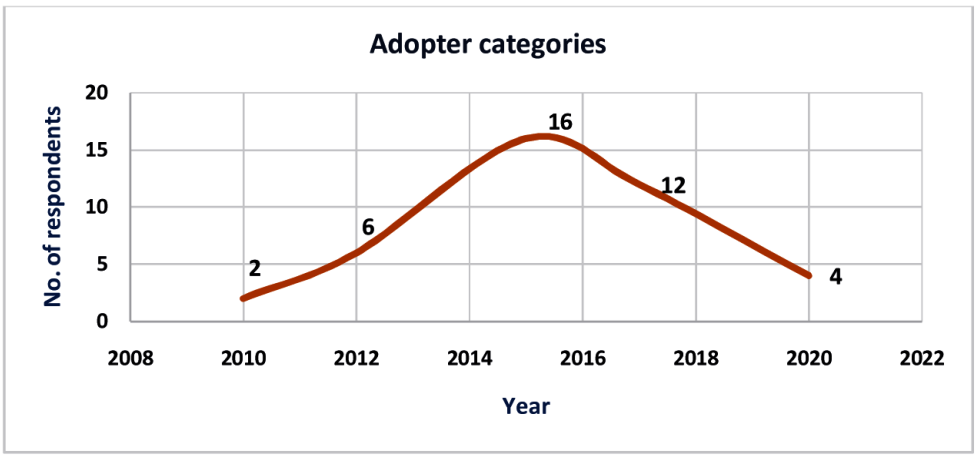

Fig. 01. Adopter categorization of respondents based on innovativeness

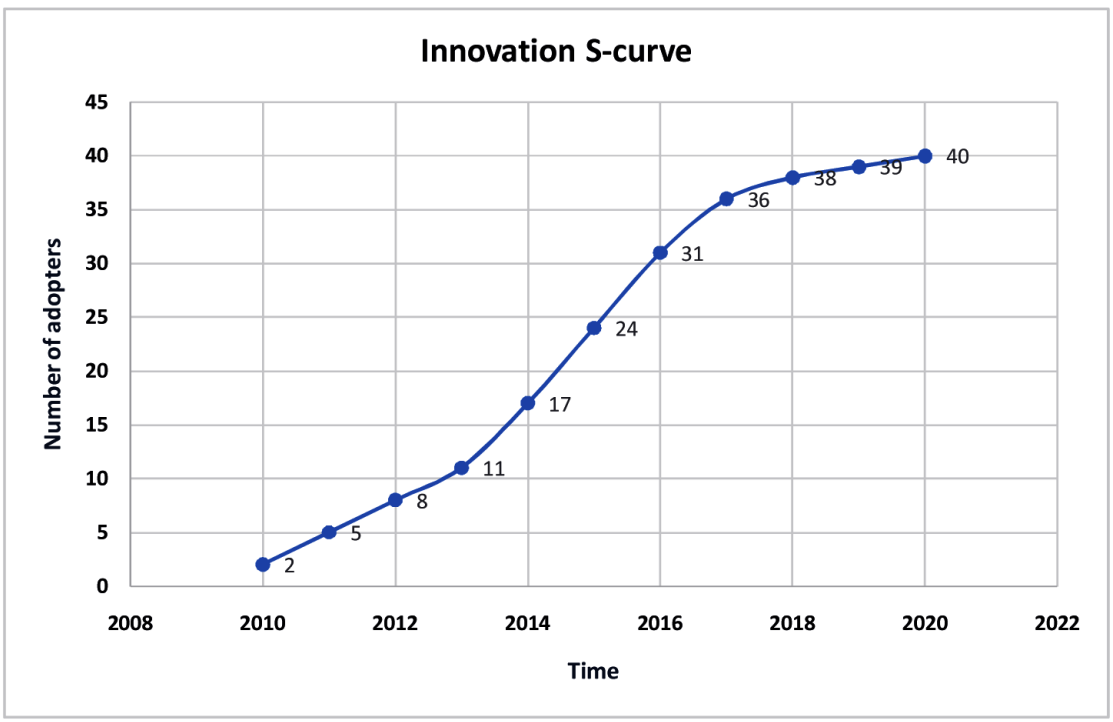

Fig. 02. Distribution of respondents based on rate of adoption

From the results of Table 03, it could be inferred that exactly two-fifths (40.00) of the respondents belonged to early majority followed by late majority (30.00 %), early adopters (15.00 %), laggards (10.00 %) and a very few (5.00 %) of innovators. The small sample size considered might be the reason for few number of innovators. Less number of laggards might be due to awareness of the variety and its benefits among the farmers.

Rate of adoption

The relative speed of innovation adoption by the members of social system can be referred as rate of adoption. Cumulative frequency is calculated for obtaining the innovation S- curve and the curve is shown in Fig. 02.

Table 04. Distribution of respondents based on factors affecting adoption of 448 variety of tomato

S. No.	Factors	Respondents	
		Number (n=40)	Percentage
1.	**Personal**		
	a) Past Experience	17	42.50
	b) Knowledge	21	52.50
2.	**Psychological**		
	a) Interest	32	80.00
	b) Scientific Orientation	9	22.50
3.	**Physical**		
	a) Availability of labour	20	50.00
4.	**Social**		
	a) Friends/Neighbours	32	80.00
	b) Progressive farmer	25	62.50
	c) Social Recognition	20	50.00
5.	**Economic**		
	a) Increase in production	27	67.50
	b) Less expensive	7	17.50
	c) Profitability	29	72.50
	d) Availability of Bank loans	0	0
	e) Availability of Subsides	0	0
6.	**Organisational**		
	a) Extension functionaries of SDA	2	5.00
	b) Private Firms	17	42.50
	c) Input Dealers	28	70.00
	d) NGO'S	2	5.00

FACTORS AFFECTING ADOPTION OF 448 VARIETY OF TOMATO

The data on factors affecting the adoption of 448 variety of tomato was measured in different dimensions of personal, psychological, physical, social, economic and organizational factors. The results were shown in Table 04.

Among the personal factors affecting more than half (52.50%) of the respondents have adopted the variety because of their knowledge and 42.50 per cent have adopted the variety because of their past experience. Majority (80.00 %) of the respondents adopted the variety on their interest in psychological factors. Among physical factors affecting adoption, half (50.00 %) of the respondents have adopted the variety because of the availability of labor.

Majority (80.00 %) of the respondents have adopted the variety with the influence of friends/ neighbors among social factors. Nearly two-thirds (62.50%) have adopted the variety because of being a progressive farmer. Half (50.00 %) of the respondent farmers have adopted the variety for social recognition. When coming to economic factors, a little more than two-thirds (67.50%) of the respondents have adopted the variety for

Table 05. Distribution of respondents based on attributes of innovation

S. No.	Attributes	Respondents	
		Number (n=40)	Percentage
1.	Relative Advantage	29	72.50
2.	Compatibility	38	95.00
3.	Complexity	04	10.00
4.	Observability	33	82.50
5.	Trialability	11	27.50

its increase in production and nearly three-fourths (72.50%) for its profitability. Among the organizational factors, most of the farmers i.e., 70.00 percent have adopted the variety because of the influence of input dealers.

ATTRIBUTES OF INNOVATION

Relative advantage is the degree to which the improved variety is better than the previous one. The degree to which the variety is perceived to be consistent with the past experiences and needs is referred as complexity. Complexity refers to the perceived difficulty to understand and use. Observability defines the visible results and trialability refers to the experimental possibility of innovation on a limited basis. The data on attributes of innovation are collected and presented in Table 5.

Nearly three-fourths (72.50%) of the respondents felt that the variety has a relative advantage because of its more vigorous nature, very good stay greenness, attractive firm fruits and higher yield potential. Most (95.00 %) of the respondents felt that the variety is more compatible to their farming situations because of its earliness and resistance to tomato yellow leaf curl virus.

Only 10.00 percent of the respondents felt that the variety is complex to adopt due to its unavailability of seed in time. Majority (82.50%) of the respondents adopted the variety due to its observability in yield and quality characters. A little more than one-fourth (27.50%) of the respondents felt that the variety has trialability.

CONCLUSION

The study summarized the profile, adopter categorization, factors affecting adoption of 448 variety of tomato and the attributes of the variety that contributed for adoption among the farmers. Escalating extension services in rural regions, where the majority of agricultural production occurs, will encourage adoption of new technologies and varieties. More impetus should be given for organizing of on-farm experiments with farmers in order to improve their technical and administrative abilities and, as a result, increase adoption of improved varieties. The properties of the innovation and technology to be diffused should consider predefined criteria, namely being felt need by most of the farmer, able to deliver concrete benefits for farmers, compatible with the farming situation, utilize the limited resources rationally, affordable, simple, easy and user friendly.

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ANALYSING THE DECISION MAKING BEHAVIOUR OF WOMEN SELF HELP GROUP MEMBERS IN CUDDALORE DISTRICT

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ABSTRACT

Women Empowerment alludes to the development of a natural for women where, just as for their general population, they can decide on their own choices for their own benefits. The study was conducted in Cuddalore Block of Cuddalore District. Proportionate random sampling procedure was applied to select 120 respondents from six villages namely Gunduuppalavadi, Kondur, Thiruvandipuram, Kudikadu, Pathirikuppam, Pachayankuppam. The results found that nearly half of the respondents (47.50 percent) were found that consulting with spouse only for decision making at all the levels followed by consulting all the family members (29.17 percent) and 11.67 percent of the respondents were found that help others in taking decision at all the levels. Women live in a male dominated society and they rely on their spouse for making their decisions. Those women members, who live in joint family were bound to rely on their family members for decision making.

Keywords: Self Help Group, Decision making behavior, Family members and Self-confidence.

INTRODUCTION

Self Help Group is a small voluntary group of disadvantaged citizens. They come together through self-help and collective help in order to solve their common problems. Amongst its members, the SHG encourages small savings. The Self Help Organization is a group of rural poor people who work to organize themselves into a group of representatives to alleviate poverty. SHGs for women are changing the face of Indian villages and improving the gender equality fabric. The women were motivated by financial independence and preparation.

The SHGs provide women with a platform for engaging with each other, recognizing their common issues, channeling their savings and promoting girls ' education. SHG seeks to enhance the quality of women's lives by self-reliance, improving their skills and ensuring community sustainability. Self Help Organizations have the ability to increase the access of vulnerable women to the resources available for income improvement and self-reliance.

METHODOLOGY

The study was taken-up in Cuddalore district of Tamil Nadu. Out of the thirteen blocks

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Table 1. Distribution of respondents according to their decision making behavior

(n=120)

S. No.	Category	No. of respondents	Per cent
1.	By self without consulting others	7	05.83
2.	Consulting with the spouse only	57	47.50
3.	Consulting all the family members	35	29.17
4.	Help from others in decision making	14	11.67
5.	No participation in decision making	7	05.83
	Total	**120**	**100.00**

in Cuddalore district, Cuddalore block was selected based on the maximum number of Self Help Groups in Cuddalore district. A sample size of 120 Self Help Group members was selected by using proportionate random sampling technique. Thirteen variables were selected for this study and they were measured by using appropriate tools and techniques. In order to identify the empowerment level of SHG members, their responses were collected on three point continuum viz., fully, partial and nil with the scores of 3, 2 and 1 respectively. The data were collected by using well-structured interview schedule, containing appropriate questions for bringing the required data. Percentage analysis and Cumulative frequency method were used for the analysis and interpretation of the data.

RESULTS AND DISCUSSION

Results on distribution of respondents according to their decision making behaviour are presented in Table 1.

From the above Table 1, it could be inferred that nearly half of the respondents (47.50 per cent) were found that consulting with spouse only for decision making at all the levels followed by consulting all the family members (29.17 per cent) and 11.67 per cent of the respondents were found that help others in taking decision at all the levels. A meager per cent (05.83 per cent) of the respondents were found to both have self-decision without consulting others and had no participation in decision making at all the levels.

CONCLUSION

Investigation was carried out to assess the decision making behavior of SHG members. Majority of SHG members found that consulting with spouse only for decision making at all the levels. The possible reasons might be that usually the women members were much dominated by their spouse. Since, they live in a male dominated society and they rely on their spouse for making their decisions. Those women

members, who live in joint family were bound to rely on their family members for decision making.

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COMMUNITY RADIO AND ITS ROLE IN IMPARTING EDUCATION FOR ADULTS

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ABSTRACT

Community Radio is speedily emerging as an effective tool of development communication. This can be successfully used for grassroot empowerment. Community Radio applies participatory communication approaches.This is a participatory type of radio service that caters to the interests of a certain area, broadcasting content that is popular to a local audience but which may often be overlooked by commercial or mass-media broadcasters. The success of the participatory community Radio depends on community participation. Participation doesn't emerge simply by meeting or involving people in programme production. Participatory programme development for Community Radio needs serious pondering. It requires formal type of research on need assessment and audience analysis which is lacking in context of most of the community radio stations of the country. Community radio has enormous potential of voicing the concerns within and between communities. This can be effective for the development of adults. Thus, apart from catering to the needs of the adults, community radio could also be helpful in solving the challenges observed by the adults. Besides, being an effective communication tool, it can promote rural people's interest in gaining knowledge and information which could eventually lead to their overall development. This research investigation was conducted in Udham Singh Nagar district of Uttarakhand. Community radio programme were developed on the basis of needs of adults. Results revealed that Community radio programme were effective in term of providing knowledge, information on the need based areas.

Key words: Community radio, adults, needs

INTRODUCTION

Community based independent media is now perceived by media activists and grassroots organizations as a means of enabling rural people and marginalized sections of the society to manage their own development and to acquire a sense of control over its course through self-management. (Banjade, 2009).

Community radio is distinguished by three essential principles: Non-profit making, Community ownership & management and Community participation. Community radio stations throughout the World have emerged as a powerful radio station initiated by individuals and groups with diverse backgrounds. (Balit, 2009). Community radio provides greater access

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and participation to its community members in every aspect of the station. (Govindaraju and Kalavathy, 2002).Community radio reflects the educational, developmental and socio-cultural needs of the specific community it serves.

In India different segments of society are facing different types of problems. The main reason is lack of information, education and knowledge on different aspects.

Total 27.6 percent people in India are come under the age group of 25-44 year followed by 13.5 percent 45-64 year age group. (Census of India, 2001).Adults are facing different types of problems.The share of population over the age of 60 years is projected to increase from 8 percent in 2015 to 19 percent in 2050. By the end of the century, the elderly will constitute nearly 34 percent of the total population in the country. According to WHO, 2001 in India majority of adults are facing different types of mental problems.

Community radio is a best medium to provide the information on mental health, stress management or other problems. (Fraser and Sonia, 2002)There is an urgent need to provide right information on right time to the each segments of the society. Present research investigation was conducted with the objective of to assess the needs of Adult women and to provide the need based information to the adults.

MATERIAL AND METHODS

Present research was conducted in district Udham Singh Nagar of Uttarakhand. Total 100 respondents were selected in the two villages of Rudrapur block. Community Radio programmes were developed on the basis of needs of the adults women. Data was collected through interview schedule and focused group discussion.

RESULTS AND DISCUSSION

General Information of Adult women

General information is given in Table 1.

Educational Level: Table 1 depicted that majority of respondents (52 percent) were educated upto the secondary level followed by primary education 25 percent and No formal education 18 percent. Only 5 per cent respondents were graduate.

Use of Information Sources: Table 1 shows thatall the respondents were using television and mobile phone.Majority of respondents (98 per cent) wereusing Internet followed by print media (89 percent). Total 45 percent respondents were interested to take information from Neighbours and Friends followed by extension agents (35 percent). Total 58 per cent respondents were using radio as an Information Communication tool.

Use of social media

Table 1 depicts that all the respondents were using Whatsapp followed by Face book (98 percent) and You Tube (97 percent).

Information needs of Adult women

Table 2 shows that majority of respondents (79 percent) were unaware about different enterprises followed by awareness about tips to avoid mental tension (75 percent). Total 70 per cent people were unaware about Yoga and Exercise followed by Government Programme for welfare of women in Uttarakhand (69 percent). More than half percent (65 percent) of adult women were unaware about Balanced Diet

Table 1: General Information of Adult women (N=100)

S.No.	Category	Number	Percent
A.	**Educational Level**		
1.	No formal Education	18	18
2.	Primary Education	25	25
3.	Secondary Education	52	52
4.	Graduation	5	5
B.	**Use of Information Sources**		
1.	Internet	98	98
2.	Television	100	100
3.	Radio	58	58
4.	Print Media	89	89
5.	Mobile Phone	100	100
6.	Extension Agent	35	35
7.	Neighbours and Friends	45	45
C.	**Use of social media**		
1.	Facebook	98	98
2.	WhatsApp	100	100
3.	You Tube	97	97

Table 2: Information needs of Adult women (N=100)

S.No.	Category	Aware	Unaware
1.	Balanced Diet	35	65
2.	Foods to keep healthy	45	55
3.	Method of cooking vegetables	67	33
4.	Effect of Hygiene on health	42	58
5.	Control of Household Pest	72	28
6.	Government Programme for welfare of women in Uttarakhand	31	69
7.	Awareness about different enterprises	21	79
8.	Awareness about Yoga and Exercise	30	70
9.	Awareness about tips to avoid mental Tension	25	75

Prioritization of Needs

Table 3: Prioritization of Needs

S.No.	Category	Aware	Unaware
1.	Awareness about different enterprises	21	79
2.	Awareness about Yoga and Exercise	30	70
3.	Awareness about tips to avoid mental Tension	25	75

Table4: Effectiveness of Community Radio programme (N=100)

S.No.	Category	Pre-Knowledge Test	Post Knowledge Test	Gain in knowledge
1.	Awareness about different enterprises	25.00	79.00	54.00
2.	Awareness about Yoga and Exercise	20.00	80.00	60.00
3.	Awareness about tips to avoid mental Tension	21.00	85.00	64.00

followed by Foods to keep healthy (55 per cent). Only 28 per cent respondents were unaware about Control of Household Pest.

Table 3 depicts that three needs viz; Awareness about different enterprises, Awareness about Yoga and Exercise, Awareness about tips to avoid mental Tensionwere selected in which more than 70 per cent people were unaware about it.

Designing and Development of Participatory Community Radio Programme

According to the results of need assessment, need prioritization of the respondents were done in relation to Adults women empowerment. After that Focused Group Discussion (FGD) with the respondents and Discussion with the experts, three community radio programme were designed and developed to cater the needs of respondents.Thus, topics on which community programme were designed, developed and broadcast under the study were:

Designing and Development of Participatory Community Radio Programme

According to the results of need assessment, need prioritization of the respondents were done in relation to women empowerment. After that Focused Group Discussion (FGD) with the respondents and Discussion with the experts, three community radio programme were designed and developed to cater the needs of respondents.Thus, three topics on which community programme were designed, developed and broadcast under the study were: [1] Awareness about different enterprises[2] Awareness about Yoga and Exercise[3] Awareness about tips to avoid mental Tension.The issues were again thoroughly discussed with them through their feedback and submission, appropriate for each programme after a formal training of selected respondents about radio programme production.

Effectiveness of Community Radio programme

Community radio programme were developed on the above needs. Community radio programme were recited by the adults women. Before implementation of community radio programme, knowledge level of adults was assessed.

Three topics were selected for the community radio programme. Data showed that knowledge level was increased after implementation of Community radio programme. The topic “Awareness about tips to avoid mental Tension” knowledge level of the respondents

were increased 64 per cent followed by "Awareness about Yoga and Exercise" (60 per cent).

Thus, we can say that Community Radio Programme was effective in terms of gain in knowledge.

CONCLUSION

It is therefore evident from the result obtained in this study that Community radio programme were effective in term of gain in knowledge. Today is the ICTs era. Community Radio play a very important role in dissemination of information, education and knowledge among the rural people.

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CONSTRAINTS FACED AND SUGGESTIONS GIVEN BY BENEFICIARY FARMERS OF PRADHAN MANTRI KRISHI SINCHAYEE YOJANA

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ABSTRACT

The present study was conducted in two Tehsils of Sangli district of Maharashtra state. Data were collected by personally interviewing 120 beneficiary farmers. Constraints refers to the problem and difficulties encountered by beneficiary farmers in the implementation of Pradhan Mantri Krishi Sinchayee Yojana. The major constraint faced by large majority (95.00 per cent) of beneficiary farmer was clogging of drippers by suspended material while (91.66 per cent) of beneficiary farmers faced the constraint that require frequent maintenance of micro irrigation system. The (86.66 per cent) of the beneficiary farmers faced difficulty to maintain proper water pressure. Further, it was found that (65.84 per cent) of beneficiary farmers faced the constraint high technical skill required to handle micro irrigation system. Suggestions were invited from the beneficiary farmers to overcome the problems faced by them in the implementation of Pradhan Mantri Krishi Sinchayee Yojana. Large majority (92.50 per cent) of the beneficiary farmers stated that subsidy should be increased. (89.16 per cent) of the beneficiary farmers suggested that subsidy should be received on time. Further (82.50 per cent) of the beneficiary farmers given suggestion that trainings should be organized frequently.(73.33 per cent) of the beneficiary farmers given suggestion that knowledge regarding fertilizer application through drip irrigation should be provided.

Keywords: Constraints, Pradhan Mantri Krishi Sinchayee Yojana

INTRODUCTION

Krishi Sinchayee Yojana Scheme was launched during the year 2015 with an objective of providing assure irrigation for obtaining higher productivity and net returns fro an unit area. The success of any programme depends on quality refinements through proper addressing of constraints by the farmers. Hence the present student was taken up with assessing the constraints faced by the farmers in the implementation of PMKSY and their suggestion to overcome the constraints.

MATERIAL AND METHODS

The study was conducted in two Tehsils of Sangli district of Maharashtra state. Six villages from each tehsil were selected based on highest and moderate total net irrigated area respectively. Ten beneficiary farmers were selected from each village randomly. Data were

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Table 1: Constraints faced by beneficiary farmers in the implementation of Pradhan Mantri KrishiSinchayee Yojana

Sr. No.	Constraints	Respondents (n=120)	
		Frequency	Percentage
1	Clogging of drippers by suspended material	114	95.00
2	Require frequent maintenance	110	91.66
3	Difficult to maintain proper water pressure	104	86.66
4	Difficulty in intercultural operations	97	80.84
5	Delay in sanction of subsidy	87	72.50
6	Lack of proper training	83	69.16
7	High technical skill required	79	65.84
8	Electricity charges are expensive	76	63.34
9	Irregular supply of electricity	72	60.00

collected by personally interviewing 120 beneficiary farmers with the help of interview schedule. Statistical tools such as frequency, percentage, mean, standard deviation and Karl Pearson's coefficient of correlation were used for grouping the data.

RESULTS AND DISSCUSSION

It was observed from table 1 that the major constraint faced by large majority (95.00 per cent) of beneficiary farmer was clogging of drippers by suspended material while (91.66 per cent) of beneficiary farmers faced the constraint that require frequent maintenance of micro irrigation system. The (86.66 percent) of the beneficiary farmers faced difficulty to maintain proper water pressure, (80.84 percent) of beneficiary farmers faced difficulty in intercultural operations, (72.50 percent) beneficiary farmers said that they faced delay in sanction of subsidy, (69.16 percent) of beneficiary farmers faced lack of proper training. Further, it was found that (65.84 per cent) of beneficiary farmers faced the constraint high technical skill required to handle

Table 2: Suggestions given by beneficiary farmers

Sr. No.	Suggestions	Respondents (n=120)	
		Frequency	Percentage
1	Subsidy should be increased	111	92.50
2	Subsidy should be received on time	107	89.16
3	Training should be organized frequently	99	82.50
4	Electricity charges should be decreased	91	75.83
5	Knowledge regarding fertilizer application through drip irrigation should be provided	88	73.33
6	Electricity supply should be regular	83	69.16

micro irrigation system. Followed by (63.34 percent) beneficiary farmers said that electricity charges are expensive. Majority (60.00 per cent) of the beneficiary farmers said that they faced irregular supply of electricity.

The data in the table 2 revealed that large majority (92.50 percent) of the beneficiary farmers stated that subsidy should be increased. (89.16 per cent) of the beneficiary farmers suggested that subsidy should be received on time. Further (82.50 percent) of the beneficiary farmers given suggestion that trainings should be organized frequently. About (75.83 per cent) of the beneficiary farmers reported that electricity charges should be decreased while (69.16 per cent) of beneficiary farmers suggested that electricity supply should be regular. (73.33 per cent) of the beneficiary farmers given suggestion that knowledge regarding fertilizer application through drip irrigation should be provided.

CONCLUSION

The (86.66 per cent) of the beneficiary farmers faced difficulty to maintain proper water pressure while (69.16 per cent) of beneficiary farmers faced lack of proper training. Trainings and method demonstrations should be imparted to the beneficiary farmers for betterment of their knowledge and skills regarding the use of the system effectively and efficiently. Technical guidelines should be conveyed to them through frequent visits of extension workers to the farmers' fields.

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IMPACT OF COVID-19 ON FARMING ACTIVITIES IN VISAKHAPATNAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

The Covid-19 situation severely affects different walks of life, especially service sector, Manufacturing sector, Tourism, Education, Transportation etc . The agricultural sector comparatively less affected. Visakhapatnam is no exemption from this situation. But There is a remarkable impact in certain areas in Agriculture in Visakhapatnam district of Andhra Pradesh. In Visakhapatnam district, Paddy is the major crop occupies 1 lakh hectares, It requires huge quantity of inputs, labor and needs timely marketing facilities. The study reflects that , the income level decreased by 11% during Covid -19 situation. The percentage increase in labor cost increased by 19% during Covid situation. The percentage increase in cost of cultivation in Paddy increased by 14% during Covid situation. With regard to Constraints, the major constraints observed are non availability of Labor, Reduction in labor working hours per day, Non availability of inputs ,Late receipt of amount for sold produce, Exploitation of Middlemen,Non availability of advisory support ,Lack of government support and Poor marketing facilities.

INTRODUCTION

The world has faced a unique and acute problem of Corona (Covid-19). Several countries across the globe affected severely in all walks of life. The mankind has faced threatening situation both health wise and also on economic fronts. For a country like India with huge population, dwelling in a different locations under different situations faced a very challenging problems. Many sectors like service sector, Manufacturing sector, Business, Tourism, Education, Transportation, Industry, Export & Imports sector etc get severely affected. Both Public and Private sectors severely affected. Huge man power migrations took place from Urban India to Grameen Bharat.

For Rural India agriculture is the major source of livelihood. 90 % of Rural population depends on Agriculture. Under this situation a study was under taken on “Impact of COVID-19 on Farming activities in Visakhapatnam district of Andhra Pradesh”. The study was taken up under constraint situation of Corona and efforts made to elicit the impact of Covid-19 on Agricultural sector. The present study was taken up with the following objectives

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1. To study the impact of Covid-19 on Cost of cultivation & Marketing of Paddy .

2. To study the impact of Covid-19 on labor wages.

3. To study the impact of Covid-19 on Constraints faced by farmers in Agriculture.

MATERIAL AND METHODS

Locale of the study : The study conducted in Visakhapatnam district covering three KVK operational mandals **(**Ravikamtham, Butchaipeta, Chodavaram) and six villages (Medivada, Garnikam, L.Singavaram, Bangarumetta, VRRPeta, and Kumundanipeta).

Sample size: 60 farmers selected from 3 Mandals × 2 Villages × 10 farmers from each village.

Sampling method: Simple Random Sampling method.

Table 1

Impact of COVID – 19 on Labour availability and Labour wages of Paddy crop.

Cost of item	No. of Labour required	Labour wages		
		Previous Year	Current Year	% change
Human Labour: Break-up				
Seed bed preparation	2 (Male)	1000.00	1200.00	20
Land preparation, Puddling and Levelling.	1 (Male)	500.00	600.00	20
Pulling and carying of seedlings	4 (Male)	2000.00	2,500.00	25
Transplantation	10 (Female)	2000.00	3000.00	50
Weeding	4 (Female)	1000.00	1500.00	50
Spraying of Pesticides	5 (Male)	500.00	750.00	50
Application of Manures and Fertilizers	5 (Male)	500.00	750.00	50
Irrigating the field	5 (Male)	500.00	750.00	50
Rat Control	3	1000.00	1000.00	-
Total Human labor cost	39 no's	9000.00	12,050.00	33.89
Percent Increase of Labour wages			33.89 %	

Table 2

Impact of COVID – 19 on overall cost of cultivation :

Cost of item	Previous Year	Current Year	% increase
Total Material Cost (Seed, Herbicides, Insecticides, Fertilizers and Manures) (Rs.)	10,200.00	10,500.00	2.85
Total Machine Labour cost (Rs.)	5,300.00	5,500.00	3.77
Total Human Labour Cost (Rs.)	9000.00	12,050.00	33.88
Total cost of Cultivation (Rs.)	24,500	28,050.00	14.48

Table 3 Impact of COVID – 19 on Marketing of Produce during Kharif 2020 – 21

Crop	Market Price in Rs /Q		Deviation Rs	Average Yield (Ac)	Expected Income /ac	Actual Income/ ac	Deviation	Percent loss incurred
	Market / MSP	Actual price received						
Paddy	1815	1700	115(6.76%)	3750 Kg	68,063.00	63,750.00	4,313.00	11.33 %

Data collection: Through Structured Interview Schedule

RESULTS AND DISCUSSION

As a part of study, a focused study was done on Impact of COVID – 19 on Labour wages of Paddy crop. The outcome of the study reveals that , There is a overall increase of 38% labor wages with a break up of 50% increase in labor wages with regard to Transplantation, Weeding, Spraying of pesticides, Application of manures and Fertilizers and Irrigation to Paddy fields. There is 25% increase in labour wages with regard to pulling and carving of seedlings and 20% increase in labor wages with regard to Land preparation, Puddling and Levelling of field and Seed bed preparation. The details as mentioned Table 1.

Table 4 Problems / Constraints faced by farmers during lock down period: Agriculture (Paddy):

N:60

S. No.	Problems/ Constraints	Frequency	Percentage	Rank
1.	Late receipt of amount for sold produce	44	73.33 %	III
2.	Non availability of Labour	52	86.67 %	I
3.	High labour wages	49	81.66%	II
4.	Reduction in labour working hours per day	36	60.00 %	IV
5.	Non availability of inputs	32	53.33 %	V
6.	Exploitation of Middlemen	27	45.00 %	VI
7.	Non availability of advisory support	12	20.00 %	IX
8.	Lack of government support	8	13.33 %	X
9.	Poor marketing facilities	21	35.00 %	VII
10.	Difficulty in getting harvesting machinery	16	26.67 %	VIII

The study with regard to impact of Covid-19 implies that, there is 33.88% increase in human labour cost during Covid period, compared to previous year followed by 3.77% increase in cost with regard to machine labour cost and there 2.85% increase in material cost during Covid period compared to previous year (Table 2).

The outcome of the study with regard to market price reflects that there is 6.76% decline in price received by the Paddy farmers during Covid period and The farmers received 11.33% less income per acre during Covid 19 period compared to previous year.

As per the study, the following constraints observed as per the intensity, among them Non availability of labor ranks Ist followed by high labor wages, Late receipt of amount of sole produce , Reduction in working hours of labor, Non avaialabilty of inputs, Exploitation of middle men, Poor marketing facilities, difficulty in getting harvested machinery, Non availability of timely advisory services and lack of Govt support.

CONCLUSION

In case of Paddy the income level decreased by 11% during Covid-19 situation during 2020. The percentage increase in labor cost increased 19% during Covid situation. The percentage increase in cost of cultivation in Paddy increased by 14% during COVID situation.

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AGRISTARTUP ENVIRONMENT OF FARMERS ON ARTIFICIAL INTELLIGENCE IN TELANGANA

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ABSTRACT

Agristartups Artificial intelligence plays an important connecting the farmers to smart technologies. Artificial intelligence technologies helps the farmers analyze land, soil, health of the crop and also allow the farmers by saving time in growing right crop in each season that gives best yield. There is need of addressing challenges such as inadequate demand prediction, access to markets, inputs, data, advisory, misuse or overuse of pesticides and fertilizers, lack of assured irrigation and labour shortage in various operations, assurance in credit and insurance etc, which can be attained through driven decision making Tech enablement, along with increased connectivity at the farm level through precision techniques, usage of AI and cloud computing for crop and soil monitoring, predictive pest infestation analysis, agri robotics and smart supply chain solutions, etc., will help drive efficiency and value addition across the agricultural value chain. These AI technologies can be improved through agristartups to reach farmers within the time constraint. Thus, this study was conducted in Telangana region. In Telangana three agristartups on artificial intelligence like Thanos technologies, Bharatrohan and Plantix were selected. Majority of the farmers belong to middle age (58.90%), had high digital literacy (48.90%), with semi- medium holdings (45.60%) and low farming experience (55.60%), low farm equipment possession (87.80%), low social networking (47.80%), and medium level of innovativeness (52.20%).and the variables such as farming experience, social networking and innovativeness had positive and significant relationship with agristartup environment as perceived by famers at one percent level of significant. The variables such as digital literacy had positive and significant relationship with agristartup environment as perceived by famers at five percent level of significant. The variables such as age, farm size and farm equipment possession was found positive and non-significant with agristartup environment as perceived by famers.

Key words: agristartups, artificial intelligence and agristartup environment

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INTRODUCTION

Agriculture is the backbone for 49% of India's workforce, 16% of its contribution in gross domestic product (GDP), with the provision of food security to 1.3 billion people. To achieve and maintain a higher annual growth rate of 8 to10% for the Indian economy, agriculture sector has to grow with 4% or higher growth rate. India was the ninth largest exporter of agricultural products accounting for 12.6% among all exports (Vikram *et al*, 2019). According to government of india, A startup is an entity that is headquartered in India, which was opened less than 10 years ago and has annual turnover of less than 100 crore rupees. In India Startup India initiative programme was launched by honourable prime minister on January 2016, to build strong ecosystem for promoting innovations and startups in the country further which would encourage sustainable growth and create large scale employment opportunities.

Artificial intelligence will have significant global impact on agricultural productivity at all levels of the value chain. Globally, digital and AI technologies are helping solve pressing issues across the agriculture value chain. An estimate by Markets and Markets Research valued AI in agriculture will be valued at USD 2.6 billion by 2025. Globally, AI applications in agriculture reached a valuation of $852.2 million in 2019 and this is estimated to grow to almost $8.38 billion by 2030, a nearly 25 per cent growth. According to CB Insights, agricultural tech start-ups have raised over USD 800 million in the last 5 years.

It is estimated that Artificial Intelligence (AI) and connected farm services can impact seventy million farmers by 2020 there by adding nine billion dollars to farmers income. National Institution for Transforming India (NITI Ayog, 2018) came up with a National Strategy of Artificial Intelligence in India, which is aimed at focusing on economic growth and social inclusion. Artificial intelligence and big data are going to be game changer in the agriculture sector and the government is aiming to collate about 80 percent of such data by 2020 (Rahul, 2020).

Agristartups on Artificial intelligence helps farmers to analyze land/soil/health of crop *etc* save time and allow farmers to grow right crop in each season that has best yield. It can reduce the problems with labour unavailability and allows prediction of next year crop seasons/weather/ climate/rainfall *etc*. AI based predictions helps in suggesting appropriate pesticides/crops/place at right time before large scale incidence of disease. Even it provides assistance to farmers with answers to all their queries and giving relevant advice and recommendations to their specific farm related problems.

MATERIAL AND METHODOS

The state of Telangana was chosen since researcher hails from the state and was familiar with local language and culture. Telangana state was selected purposively for the study. Three (3) Artificial intelligence based agristartups will be selected purposively from based, precision management and agro advisory startups namely Thanos technologies, bharat rohan and plantix respectively were selected purposively. From each agristartup 30 farmers will be selected randomly. Total sample consists of 30 agristartup entrepreneurs and 90 farmers will be selected randomly (based on farmers who are receiving services continuously form last three years from that particular startup).

RESULTS AND DISCUSSION

Profile characteristics of farmers

TABLE 1: Distribution of farmers according to their Age (N=90)

S.No	Age	Frequency	Percentage
1	Young Age(<35 years)	32	35.60
2	Middle Age(35-55 years)	53	58.90
3	Old Age (>55 years)	05	5.60
Total		90	100.00

TABLE 2: Distribution of farmers according to their Digital literacy (N=90)

S.No	Digital literacy	Frequency	Percentage
1	Low (12-28)	09	10.00
2	Medium (29-45)	37	41.10
3	High (46-62)	44	48.90
Total		90	100.00

Table.1 shows that majority (58.90%) of the farmers belong to middle age followed by young age (35.60%) and old age (5.60%) farmers. From the table1. it can be illustrated from the table that the majority of farmers belongs to middle and young age group. This result may be due to that middle and young aged farmer have more exposure to digital knowledge.

Table 2. shows that majority (48.90%) of the farmers have high level of digital literacy followed by medium (41.10%) and low (10.00%). From the Table 2. it can be illustrated from the table that the majority of farmers had high and medium level of digital literacy. This result may be due to that most of the young and middle age farmers are educated and have their own smartphones where there have access to various agristartups on artificial intelligence.

Table 3 shows that the majority (55.60%) of the farmers receiving services from agristartups on artificial intelligence had low farming experience followed by high (24.40%) and medium (20.00%) levels. From the Table 3, it can be depicted that the majority of farmers had a low to medium of farming experience. This is obvious due to the earlier finding reported that majority of the farmers using social media belong to young and middle age.

TABLE 3. Distribution of farmers according to their Farming experience (N=90)

S.No	Farming experience	Frequency	Percentage
1.	Low(4-16)	50	55.60
2.	Medium (17-29)	18	20.00
3.	High (30-42)	22	24.40
Total		90	100.00

TABLE 4. Distribution of farmers according to their social networking (N=90)

S.No	Social networking	Frequency	Percentage
1.	Low (12-18)	43	47.80
2.	Medium (19-25)	31	34.40
3.	High (26-32)	16	17.80
Total		90	100.00

Table 4 shows that the majority (47.80%) of the farmers receiving services from agristartups on artificial intelligence had low social networking followed by medium (34.40%) and high (17.80%) levels. From the table 4.it can be depicted from the above that majority of the famers had medium level of social networking. This might be due to the possible reason that lack of contacts with experts related to agristartups on artificial intelligence.

Table 5 shows that the majority (52.20%) of the farmers receiving services from agristartups on artificial intelligence had medium level of innovativeness followed by low (27.80%) and high (20.00%) levels. From the table 5.it can be depicted from the above that majority of farmers had medium level of innovativeness. This might be due to the possible reason that increased level of awareness of the new technologies on agristartups on artificial intelligence among the young famers.

RELATIONSHIP BETWEEN AGRISTARTUP ENVIRONMENT AND FARMERS

Null hypothesis (H0)

There will be no significant relationship between profile characteristics of farmers and Agristartup environment as perceived by farmers

Empirical hypothesis (H1)

There will be significant relationship between the profile characteristics of farmers and Agristartup environment as perceived by farmers

Table 5. Distribution of farmers according to their innovativeness (N=90)

S.No	Innovativeness	Frequency	Percentage
1.	Low (24-32)	25	27.80
2.	Medium (33-41)	47	52.20
3.	High (42-50)	18	20.00
Total		90	100.00

It was observed from the Table that there was a significant positive relationship between variables digital literacy, farming experience and Agristartup environment as perceived by farmers. The possible reason for above trend might be attributed to the fact that the farmers with middle, young age as their age increases the exposure to digital literacy is increased and also has high farming experience working with the agristartups on artificial intelligence which in turn influence the Agristartup environment. The age was observed positive and non-significant relation, the probable reason might be due to irrespective of their holdings young and middle age farmers are trying out new technologies and are utilizing the services from the agristartups on artificial intelligence. The variable innovativeness was found positive and significant, this might be due to middle and young age farmers are curious in trying out of new technologies and agristartups on artificial intelligence are the new happenings in the field of agriculture.

CONCLUSION

The study concluded that there was a significant difference between the profile characteristics of farmers and Agristartup environment. Majority of the young farmers are interested in utilizing the services from the agristartups on artificial intelligence. There is

Table 6. Relationship between agri. start-up environment and farmers

S.No	Profile characteristics of farmers	Correlation Coefficient (r)
1.	Age	0.132NS
2.	Digital Literacy	0.175*
3.	Farming experience	0.290**
4.	Social networking	0.258**
5.	Innovativeness	0.252**

****Significant at 0.0l level *Significant at 0.05 level NS = non-significant**

need of more regulatory policies from the government and custom hiring agristartup applications need to be encouraged.

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AWARENESS AND ADOPTION OF FARMERS ON ANGRAU BT COTTON PRODUCTION TECHNOLOGY IN GUNTUR DISTRICT OF ANDHRA PRADESH

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ABSTRACT

This investigation was carried out in Guntur district of Andhra Pradesh during the year 2020-21. Sixty farmers from 6 villages (2 villages each from three major cotton cultivating mandals) were the sample for this study. Majority of the cotton farmers were not adopting NPK management, drought /heavy rains management, sucking pests management, Tobacco Streak Virus management, root rot/ wilt management, rust management, Black arm management, grey mildew management, boll worm management and sowing time as per the ANGRAU recommendations. The major reasons for non adoption were in anticipation of higher yields, lack of demonstrations on recent technologies, consulting private dealers, lack of knowledge and awareness on new technologies, increased pest incidence, inability to differentiate between pests, diseases and micronutrient deficiency symptoms, lack of proper channel to know recent technologies, lack of input availability and lack of initiative from farmers' side. Farmers' education, mass media use, innovativeness, extension contact and trainings undergone had significant positive correlation at 0.01% level with their awareness and extent adoption of ANGRAU recommended cotton production technology. The major constraints encountered in Bt cotton production were severe Pink Boll Worm incidence, increased cost of cultivation, increased sucking pests incidence, micronutrient deficiencies, poor yields, wilt problem, terminal moisture stress, flower and boll drop and fluctuations in market price.

INTRODUCTION

Being one of the vital commercial fibre crops, cotton plays a prominent role in the national and international economy due to its high commercial value; it is also popularly known as 'White Gold'. Cotton is valued in India for its fibre and vegetable oil. Textile raw material, cotton seed as a major source of vegetable oil and cotton cake as a rich source of high quality protein for livestock feed are the diverse products obtained from cotton. Cotton is the backbone of Indian textile industry with 59% of the country's total fiber production, 34% of the country's export and fetching about Rs.50, 000 crores annually to the exchequer. India stands first in the world in cotton cultivation with 12.66 million hectares of area constituting about 38% to 41% of the world area under cotton cultivation

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and ranked first in production yielding 28.71 million bales production and productivity of 466 Kgs per ha (Source: Directorate of Economics & Statistics, 2019). It provides livelihood to Six million farmers and 40 to 50 million people employed in cotton trade and processing. (Source: www.agrifarming.in). However, even with highest area under cotton which is 9 million hectares; India occupies third position with only 13% of global production share (Himadri Roy *et al*, 2018). More than three fourth of cotton production is from Maharashtra, Gujarat, Telangana, Andhra Pradesh and Karnataka states. In Andhra Pradesh cotton is cultivated in 10 lakh ha area with production of 50 lakh bales with productivity 880 kg/ha. Cotton is one of the important commercial crops in Guntur district with an area of 4.27 lakh acres (Source: www.karshak.ap.gov.in).

In achieving higher production, productivity and reduced cost of cultivation in cotton cultivation in particular or in any crop in general adoption of good management practices is crucial. Adoption of recommended practices facilitates in reaching maximum production potential of any crop. Pest and disease attack is one of the crucial factors in cotton cultivation affecting yield levels significantly. The loss due to it is 13% to15% which is a serious concern. Indiscriminate use of chemical fertilisers and pesticides is another serious issue which is hindering farmers to get optimum net returns. Application of recommended input at right time using right method is utmost important to make the cotton cultivation profitable. Keeping in view of all these factors this study was taken up with the below objectives

1. To study the awareness and extent adoption of Bt cotton recommended production technology by the farmers
2. To explore the reasons for Non adoption of recommended Bt cotton production technology by the farmers
3. To find the relationship between profile characteristics of farmers with their awareness and extent adoption on recommended Bt cotton production technology
4. To elicit the constraints in Bt cotton production

MATERIAL AND METHODS

The present investigation was carried out during the year 2020-21 in Guntur district of Andhra Pradesh state. Ex-post -facto research design was used for the study purpose. Out of 57 mandals, three major cotton growing mandals viz., Narasaraopeta, Macherla and Piduguralla were selected. Two villages were selected from each mandal. Lingamgunta, Kesanapalli villages of Narasaraopeta mandal, A. Jammalamadugu, Mutyalampadu villages of Macherla and Mannesultanapalem and Karlapadu villages of Piduguralla were selected.

From each village 10 cotton farmers were randomly selected using simple random sampling method, thus making the total sample size sixty. The socio- economic characteristics viz., age, education, land holding, farming experiance, mass media use, innovativeness, social participation, economic motivation, extension contact and tarinings undergone were studied using structured schedule. All the Bt package of practices recommended by Acharya N G

Ranga Agricultural University (ANGRAU), Andhra Pradesh were included in the schedule were administered to the respondents and the responses were obtained based on their adoption and non adoption. The recommended Bt cotton package includes 18 components right from sowing time to harvesting and post harvesting management. The relationship between socio-economic and psychological characteristics of farmers with awareness and extent adoption was studied using correlation coefficient analysis. Reasons for non adoption of package of practices as recommended by ANCRAU and constraints in cotton cultivation were recorded using open ended questions. The data were collected with the help of structured schedule, it was coded, tabulated and analysed by using frequency, percentage, mean and standard deviation to make findings meaningful and easily understandable.

RESULTS AND DISCUSSION

Awareness of Farmers on ANGRAU cotton production technology

From Table 1 it is evident that great majority of the farmers were aware of recommended sowing time (95.00%), seed rate (88.33%), sowing method (75.00%), sowing distance (70.00%) and water management (61.67%). Ather Mahmood *et al* (2017) reported similar results pertaining to farmers' awareness on seed rate and sowing time in cotton cultivation. The major reason for their awareness was majority of them were cultivating cotton for a long period and they know importance of sowing time, seed rate, sowing method and sowing distance in getting optimum yields. Majority of the farmers were unaware of Tobacco streak Virus management (85.00%), Root rot/wilt management (83.33%), P management and Grey mildew management (81.67%), Rust management (78.33%), N management and Drought /heavy rains management (76.67%), Black arm management (75.00%), Micronutrient management (68.33%), Leaf spot management and K management (63.33%) and Boll rot management (60.00%). Farmers were unaware of fertilizer management and disease management this was majorly because they were using the fertilizers as used by their fellow farmers and some of the diseases were not prominent in their areas.

Adoption of ANGRAU cotton production technology by the Farmers

From Table 2 it is clear that majority of the farmers were adopting the recommended sowing method (86.67%), water management (71.67%), sowing distance (68.33%), seed rate (61.67%) and weed management (50.00%). Vysali *et al.* (2019) and Kalidasan *et al.* (2020) reported that majority of the cotton farmers adopted sowing distance and seed rate. Great majority of the farmers were not adopting P management (91.67%), N management (90.00%), micro nutrient management (86.67%), K management (83.33%), Drought /heavy rains management (80.00%), Sucking pests management (73.33%), Tobacco streak Virus management (71.67%), Root rot/wilt management (70.00%), Rust management (68.33%), Black arm management (66.67%), Grey mildew management (65.00%), Boll worm management (63.33%) and sowing time (61.67%) as per the ANGRAU recommendations. These results are on par with Vysali *et al.* (2019) and Kalidasan *et al.* (2020). The probable reason for non adoption of fertilizer management was lack of knowledge on correct

recommendation and in anticipation of higher yields they were using more than recommended NPK fertilizers. With respect to pests and disease management also farmers were not adopting as per recommendation as they were unable to differentiate symptoms of pests and diseases with micro nutrient deficiencies and they were depending on private dealers for pests and disease management suggestions, who are recommending combinations of pesticides.

Reasons for non adoption of recommended production technology by the cotton farmers

The major reasons (Table 3) for non adoption of recommended production technology by the cotton farmers were in anticipation of higher yields (88.33%), lack of demonstrations on recent technologies (86.67%), consulting private dealers (85.00%), lack of knowledge and awareness on new technologies (80.00%), due to increase of pest incidence (73.33%), inability to differentiate between pests, diseases and micronutrient deficiency symptoms (68.33%), lack of proper channel to know recent technologies (61.67%), lack of input availability (60.00%) and lack of initiative from farmers side (55.00%). The first and foremost reason expressed by the farmers for non adoption of recommended fertilizer and pest and disease management was in anticipation of higher yields. Farmers were competing with their fellow farmers in using fertilizers and pesticides indiscriminately in anticipation of higher yields but in reality leading to indebtedness with drastically increased cost of cultivation. Next major reason for non adoption of recommended technology was consulting private dealers as they used to take all agricultural inputs viz., seeds, fertilizers, pesticides and herbicides from local dealers on loan. This was another major reason for indiscriminate use of agricultural inputs due to incorrect recommendations by the local dealers. Lack of demonstrations on recent technologies led to lack of awareness hindering the adoption of recommended production technologies by the farmers. Most of the times farmers were failing to identify the differences between pests, diseases symptoms with micro nutrient deficiency symptoms which led to adopt wrong management. As the major reasons for non adoption of recommended technology majorly emphasized on lack of awareness, demonstrations and dependence on private dealers it is the need of the hour to focus on organising need based awareness programmes, demonstrations and trainings to farmers as well as to input dealers in order to avoid indiscriminate use of agricultural inputs by the farmers and ultimately enhancing the adoption levels.

Relationship between profile characteristic of farmers with their awareness and adoption of ANGRAU recommended Bt cotton production technology.

Perusal of Table 4 revealed that farmers' education, mass media use, innovativeness, extension contact and trainings undergone had significant positive correlation at 0.01% level with their awareness and extent adoption of recommended ANGRAU cotton production technology. Education is the one of the crucial factors which directly affects the awareness and extent adoption of the farmers by facilitating farmers to be familiar with the recent developments in agriculture and other fields. Mass media use is another factor which enhances the awareness of the farmer which

Table 1. Awareness of Farmers on ANGRAU cotton production technology

n=60

S.No	Technology	Aware		Not Aware	
		Freq.	%	Freq.	%
1.	Sowing time	57	95.00	3	5.00
2.	Seed rate	53	88.33	7	11.67
3	Sowing distance	42	70.00	18	30.00
4	Sowing method	45	75.00	15	25.00
5	Water management	37	61.67	23	38.33
6.	Weed management	25	41.67	35	58.33
7.	Micronutrient management	19	31.67	41	68.33
8.	Fertilizer management a. N management	14	23.33	46	76.67
	b. P management	11	18.33	49	81.67
	c. K management	22	36.67	38	63.33
9	Drought /heavy rains management	14	23.33	46	76.67
10	Sucking pests management	23	38.33	37	61.67
11	Boll worm management	28	46.67	32	53.33
12	Root rot/wilt management	10	16.67	50	83.33
13	Black arm management	15	25.00	45	75.00
14	Leaf spot management	22	36.67	38	63.33
15	Grey mildew management	11	18.33	49	81.67
16	Rust management	13	21.67	47	78.33
17	Boll rot management	12	20.00	48	60.00
18.	Tobacco streak Virus management	9	15.00	51	85.00

Table .2 Adoption of ANGRAU cotton production technology by the Farmers

n=60

S.No	Technology	Adoption level			
		Adopted		Not adopted	
		Freq.	%	Freq.	%
1.	Sowing time	23	38.33	37	61.67
2.	Seed rate	37	61.67	23	38.33
3	Sowing distance	41	68.33	19	31.67
4	Sowing method	52	86.67	8	13.33
5	Water management	43	71.67	17	28.33
6.	Weed management	30	50.00	30	50.00
7.	Micronutrient management	8	13.33	52	86.67
8.	Fertilizer management				
	a. N management	6	10.00	54	90.00
	b. P management	5	8.33	55	91.67
	c. K management	10	16.67	50	83.33
9	Drought /heavy rains management	12	20.00	48	80.00
10	Sucking pests management	16	26.67	44	73.33
11	Boll worm management	22	36.67	38	63.33
12	Root rot/wilt management	18	30.00	42	70.00
13	Black arm management	20	33.33	40	66.67
14	Leaf spot management	27	45.00	33	55.00
15	Grey mildew management	21	35.00	44	65.00
16	Rust management	19	31.67	41	68.33
17	Boll rot management	23	38.33	37	61.67
18.	Tobacco streak Virus management	17	28.33	43	71.67

ultimately leads to adoption of recommended technology. Innovativeness of the farmers helps them to get acquainted with the day to day technological developments in the field of agriculture. Hence more the innovativeness more will be the awareness as well the extent adoption of recommended production technology. Extension contact and trainings undergone were known to propel the adoption process as they are best means to farmers to update their knowledge as well as to adopt the technologies at correct time and with right method. Himadri Roy *et al* (2018) reported that education and innovativeness had positive

Table. 3 Reasons for non adoption

n=60

S.No	Reason	Frequency	Percentage
1	Due to increase of pest incidence	44	73.33
2	Anticipation of higher yields	53	88.33
3	Consulting private dealers	51	85.00
4	Lack of knowledge and awareness on new technologies	48	80.00
5	Lack of demonstrations on recent technologies	50	86.67
6	Lack of input availability	36	60.00
7	Inability to differentiate between pests, diseases and micronutrient deficiency symptoms	41	68.33
8	Lack of proper channel to know recent technologies	37	61.67
9	Lack of initiative from farmers side	33	55.00

Table 4. Correlation of personal and socio –economic and psychological characteristic of farmers with awareness and adoption of ANGRAU cotton production technology

(n=60)

S. No.	Independent variable	"r" value	
		Awareness	Adoption
1	Age	0.103	0.201
2	Education	0.562**	0.640**
3	Land holding	0.111	0.035
4	Farming experience	0.026	0.108
5	Mass media use	0.486**	0.506**
6	Innovativeness	0.675**	0.510**
7	Social participation	0.165	0.189
8	Economic motivation	0.081	0.191
9	Extension contact	0.536**	0.498**
10	Trainings undergone	0.696**	0.560**

** Significant at 1 per cent

Table 5. Constraints confronted by the farmers in Bt cotton production

n=120

S. No.	Constraints	Freq	Per cent	Rank
1	Sucking pests	56	93.33	III
2	Micronutrient deficiencies	44	73.33	IV
3	Terminal moisture stress	35	58.33	VII
4	Wilt problem	36	60.00	VI
5	Poor yields	43	71.67	V
6	Increased cost of cultivation	58	96.67	II
7	Pink boll worm incidence	59	98.33	I
8	Fluctuations in market price	25	41.67	IX
9	Flower and boll drop	31	51.67	VIII

correlation with cotton farmers' adoption of recommended production technology.

Constraints confronted by the farmers in Bt cotton production

Major constraints faced by the farmers in cotton production were severe Pink Boll Worm incidence (98.33%), increased cost of cultivation (96.67%), sucking pests incidence (93.33%), micro nutrient deficiencies (73.33%), poor yields (71.67%), wilt problem(60.00%), terminal moisture stress (58.33%), flower and boll drop (51.67%) and fluctuations in market price (41.67%). Bondarwad et al (2010) reported that high cost of fertilisers, pesticides and seeds were the major constraints expressed by cent per cent of the cotton farmers.

CONCLUSION

Majority of the farmers were not adopting pests and disease management, micro nutrient management as recommended because of lack of awareness and in anticipation of higher yields. Hence, the department of agriculture need to organise as many demonstrations and training programmes as possible with the help of recently established RBK structure to create awareness on cotton production technology and also to vanish the wrong assumptions of farmers on indiscriminate use of agricultural inputs to get higher yields.

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STUDY ON APPREHENSIONS OF FARMERS ABOUT BASAL PHOSPHATIC FERTILIZER APPLICATION

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ABSTRACT

Study was conducted in Srikakulam district by selecting 60 respondents as sample size Structured interview schedule was used for collection of data from the respondents. Collected data was coded, tabulated and analyzed by using appropriate statistical tools i.e mean and standard deviation, frequency and percentages. It was observed from the study that majority of the farmers were of middle age(53.33%), middle school education (48.33%), belongs to small size of land holding(88.33%), under medium mass media exposure(55.00%) and under medium extension contact(60.00%) .In Paddy, 60 per cent of farmers were applying phosphotic fertilizers through top dressing and 40 per cent of the farmers were applying through basal application. In Ground nut, around 67 per cent of the respondents were not applying phosphotic fertilizers ,In Ragi, 60 per cent of the farmers were not applying phosphotic fertilizers, In Sugarcane, 63 per cent of the farmers were applying through top dressing.

INTRODUCTION

The country has been divided into 20 agro-ecological zones and the soils classified into 8 major groups. The organic carbon content of most Indian soils is very low and nitrogen deficiency is universal. Most of the soils are low to medium in phosphorus and potassium, and sulphur deficiencies have developed over time. Soil fertility depletion and the increasing deficiencies of certain micronutrients like iron,zinc, boron are causes of concern. Basal application of phosphotic fertilizer is not practiced by most of the farmers and top dressing of the phosphotic fertilizers causes micronutrient deficiency in the crops grown in Srikakulam district.The deficiency of at least five nutrients (N, P, K, Fe & Zn) has become fairly widespread in Srikakulam district . In this context, the study was designed to know the apprehension of farmers about basal phosphatic fertilizer application.

. **Objectives of study**

1.To study the profile characteristics of respondents.

2.To study the adoption of recommended(ANGRAU)phosphotic fertilizer application in different crops.

3.To know the apprehensions of farmers about basal phosphotic fertilizer application.

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Table 1: Distribution of respondents according to their profile characteristics.

N=60

S.NO	Variable/category	Frequency	%
1.	Age		
	a) Young age	10	16.67
	b) Middle age	32	53.33
	c) Old age	18	30.00
2	Education		
	a) Can not write and read	04	6.67
	b) Can write and read	12	20.00
	c) Primary and middle school	29	48.33
	d) High school	10	16.67
	e) College and above	5	8.33
3	Land holding		
	a) Small	53	88.33
	b) Middle	5	08.33
	c) Large	2	03.34
4	Mass media exposure		
	a) Low	10	16.67
	Medium	33	55.00
	b) High	17	28.33
5	Extension Contact		
	a) Low	11	18.33
	b) Medium	36	60.00
	c) High	13	21.67

MATERIAL AND METHODOS

A sample size of 60 respondents were selected in Srikakulam district for conducting the study. Ex post facto research design was followed for the study as variables were already occurred. Data was collected through structured interview schedule by face to face interview from the respondents. Collected data was coded, tabulated and analyzed by using appropriate statistical tools i.e mean and standard deviation, frequency and percentages.

RESULTS AND DISSCUSSION

Age, education, size of land holding, extension contact, mass media exposure of the respondents were studied and results were furnished below

Personal and social Characteristics of the respondents:

Age: It was observed from the table 1 that 53.33 per cent of the farmers were of middle age followed by old (30%) and young (16.67%) age.

Education: It was clear from the table 1 that majority of the farmers were under primary and middle school education (48.33%)followed

by functionally literate (20.00%), high school (16.67%) college and above (8.33%) and illiterate(16.67).

Land holding: A perusal of results in the table1 revealed that 88.33 per cent of the farmers were under small size of land holding followed by medium (08..33%) and large (03.33%) size of land holding.

Mass media exposure: Around 55 per cent of the respondents under medium mass media exposure followed by high (28.33%) and low (16.67%) mass media exposure could be observed from the table 1.

Extension contact: Results from the table 1 revealed that 60 per cent of the respondents were under medium extension contact followed by high (21.67%) and low extension contact (18.33%).

Adoption of Phosphatic fertilizer application in different crops

In Paddy, 60 percent of farmers were applying phosphotic fertilizers through top dressing and 40 percent of the farmers were applying through basal application (Table 2).

In Ground nut, more than half of the respondents were not applying phosphotic fertilizers around 18 per cent of the farmers were applying phosphotic fertilizers by top dressing and 15 per cent of the respondents were applying phosphotic fertilizers through basal application.

In Ragi, 60 per cent of the farmers were not applying phosphotic fertilizers, 27 per cent of the farmers were applying phosphotic fertilizers through top dressing, 13 per cent of the farmers were applying phosphotic fertilizers through basal application.

In Sugarcane, 63 per cent of the farmers were applying through top dressing, and 37 per cent of the farmers were applying phosphotic fertilizer through basal application.

Apprehensions of farmers about basal phosphotic fertilizers application:

1. If phosphotic fertilizers applied in basal, phosphotic fertilizers may go to neighbour fields through water by dissolving in it.
2. Paddy seedlings are not able to absorb nutrients if phosphotic fertilizers applied in basal application and also may affect the germination initially.

Table 2

Adoption of Phosphatic fertilizer application in different crops

N=60

S. No.	Crop	Basal Application		Top dressing		Not applying	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1.	Paddy	24	40	36	60.00	-	-
2.	Ground nut	9	15	11	18.33	40	66.67
3.	Ragi	8	13.33	16	26.67	36	60.00
4.	Sugarcane	22	36.67	38	63.33	-	-
5.	Mesta	-	-	8	13.33	52	86.67

3. Uptake of nutrients will be better if fertilizer applied after first hoeing in the crop.

4. Some of the farmers have knowledge about basal phosphotic fertilizer application and its advantage; they are not able to apply due to financial problems.

5. Some of the farmers are not applying phosphotic fertilizers in basal because lack of time and stagnation of water in the field.

6. Farmers expressed that transplanting in paddy is difficult and hazardous to health if phosphotic fertilizers applied through basal application.

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CHARACTERISTICS OF NUTRTION GARDENS - A STUDY

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ABSTRACT

Nutrition gardens are a living work of art in which the plants are arranged on a terrace, kitchen, backyard and balconies. It also consists of indoor or outdoor plants. Nutrition gardens have many other benefits like ecological benefits, water conservation, energy conservation, decorative enhancement and attraction to birds and insects. Nutrition gardens also contribute tremendously towards the health betterment of the occupants of the home. The Ex-post facto research design was used for this study. This study was conducted in three districts of Telangana state viz., Rangareddy, Hyderabad, and Medchal-Malkajgiri. The data was collected from 75 respondents through a personal interview schedule and analyzed using frequency, percentage, and mean percent score. The present study focused on characteristics of nutrition gardens like geographic location, the involvement of family members, and percentage of nutrition garden plots for growing crops and ownership of the nutrition garden. The results of the study showed that all the respondents were involved in nutrition garden. The majority of the families were involved with two persons from each family. Majority of the respondents had two years of experience in the nutrition garden. The majority of the respondents had their nutrition garden on more than 750 square feet land and out of total nutrition garden cultivation area, more than 75% of the plots were used to grow vegetables and fruits. The majority of the respondents had their own land for nutrition gardens, 96.00 percent of the respondents indicated that they were growing nutrition gardens to eat organic foods and quality produce of vegetables and fruits.

Key words: Nutrition gardens, nutrition garden characteristics

INTRODUCTION

Nutrition gardens directly offer food and nutritional security by creating access to food that can be reaped instantly, organized and served to household members every day or whenever essential. There are numerous social benefits that have arisen from nutrition gardening practices like employment opportunity, good health, improved income, nutrition security within the household and improvement in community social life. Nutrition-rich vegetable crops from own nutrition garden are the cheapest, safest and natural way to get functional food. A nutrition garden is an advanced form of garden in which vegetables are grown along with fruits, herbs, spices and other useful plants such as medicinal

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plants as a supplementary source of food and income. For small and marginal farmers, nutrition garden supply can make a significant impact to the family diet and provide several other benefits, especially for women.

Nutrition gardening can be done with almost no financial resources, using locally available planting materials, seeds, domestic waste as manures and indigenous means of pest control. Nutrition gardens can be grown in the empty space available on the terrace of the house, backyard, and balcony. Further, the vegetables and fruits reaching the market have high amount of pesticide deposits, it is in the own interest of the consumers to grow fruits and vegetables for personal consumption.

MATERIAL AND METHODOS

The Ex-post facto research design was used for this study. This study was conducted in three districts of Telangana state viz., Rangareddy, Hyderabad, and Medchal-Malkajgiri. The data was collected from 75 respondents through a personal interview schedule and analyzed using frequency, percentage, and mean percent score.

RESULTS AND DISCUSSION

The characteristics of nutrition gardens are closely related to many factors, such as their geographic location, the involvement of family members, percentage of nutrition garden plots for growing crops and ownership of the nutrition garden. These characteristics were measured by using frequency and percentages. The respondents were asked to indicate their answers.

The data given in Table 1 showed that all the respondents (100%) were involved in nutrition garden. Majority (77.33%) of the family members were involved in the nutrition garden and lesser members were not involved (22.67%). The majority (52.00%) of the families were involved with two persons from each family, followed by one family member (29.33%), three family members (12.00%) and four members (5.33%). The majority (33.33%) of the respondents had two years of experience in the nutrition garden followed by 26.67 per cent with more than three years of experience, 24 per cent with three years of experience, 13.33 per cent with one year experience, and 2.67 per cent with less than a year of experience.

The majority (45.33%) of the respondents had their nutrition garden on more than 750 square feet land followed by 29.33 per cent of the respondents on 500-750 square feet land while 22.67 percent of the respondents were growing in 250-500 square feet land, and only a few (2.67%) respondents were grown on less than 250 square feet land. Out of total nutrition garden cultivation area, more than 75% of the plots were used to grow vegetables and fruits by 38.67 percent of the respondents followed by 33.33 percent of respondents using 50-75% plots for vegetable and fruit growing, and 28.00 per cent of the respondents were using 25-50% plots for fruit and vegetable growing. The majority (89.33%) of the respondents had their own land for nutrition gardens, followed by 10.67 percent on leased land.

The results clearly showed that all respondents, together with their family members, were quite active in the growing of nutrition gardens. Despite the fact that the majority of the respondents were female, personal interviews indicated that when it comes to maintaining a

Table 1: Characteristics of nutrition garden

n=75

S. No.	Characteristics	Frequency	Percentage
1. Respondent Involvement in nutrition garden			
1.	Yes	75	100.00
2.	No	0	0
2. Family member's involvement in nutrition garden			
1.	Yes	58	77.33
2.	No	17	22.67
3. Number of family members involved in nutrition garden			
1.	1 member	22	29.33
2.	2 members	39	52.00
3.	3 members	9	12.00
4.	4 members	4	5.33
5.	5 members	1	1.33
4. Experience in nutrition garden			
1.	< One year	2	2.67
2.	One year	10	13.33
3.	Two years	20	33.33
4.	Three years	18	24.00
5.	>Three years	25	26.67
5. Operational land holding			
1.	< 250 sq.ft	2	2.67
2.	250 – 500 sq.ft	17	22.67
3.	500- 750 sq.ft	22	29.33
4.	>750 sq.ft	34	45.33
6. Percentage of nutrition garden used for growing vegetable and fruits			
1.	25-50%	21	28.00
2.	50-75%	25	33.33
3.	>75%	29	38.67
7. Ownership of land utilised for growing nutrition garden			
1.	Own	67	89.30
2.	Leased	8	10.60

nutrition garden, they do not differentiate between family members based on gender, since nutrition gardening is a family-oriented activity rather than an individual activity. The findings were consistent with Awasthi *et al*. (2016)

The majority of the respondents had two years of experience in nutrition gardening. This might be due to the urbanization and the cost of vegetables being high during COVID 19 pandemic. The majority of the respondents

owned land that was more than 750 square feet. This is because allotting land in urban areas to grow nutrition gardens is difficult, but still the respondents thought that available space like backyards, balconies and terraces should be used to grow nutrition gardens, which resulted in the allocation of maximum amount of land for nutrition gardens. These results were in agreement with Prasad (2018).

Reasons to grow nutrition gardens

To study the reasons to grow nutrition gardens the reasons were categorized as follows: generate additional income, spend time with family, mental and physical relaxation, attract helpful organisms, and eat organically produced foods, passionate about nutrition garden. The observations are presented in the form of frequency and percentages, as shown in table.

Table 2 showed that (96.00%) of the respondents indicated that they were growing nutrition gardens to eat organic foods and quality produce of vegetables and fruits which was ranked first, followed by 60.00 per cent of the respondents who were passionate about growing nutrition gardens ranked second, 58.67 per cent of the respondents indicated that they were growing nutrition garden for mental and physical relaxation ranked third,

44.00 per cent of the respondents had grown nutrition garden to beautify their home surroundings ranked fourth, 25.33 percent of the respondents had grown nutrition garden to attract helpful organisms ranked fifth, 16.00 percent of the respondents were growing nutrition garden to spend time with their family ranked sixth and very few 4.00 percent of the respondents were growing nutrition garden to generate additional income ranked seventh.

Most of the respondents maintain organic nutrition gardens because they felt that vegetables and fruits available in the market had significant pesticide residues, were not fresh, and leafy vegetables were grown in polluted water under poor hygienic conditions.

Table 2: Distribution of respondents according to the reasons to grow nutrition garden

n=75

S. No.	Reasons	F	%	Rank
1.	To eat organically produced foods	72	96.00	I
2.	Passion for about nutrition garden	45	60.00	II
3.	For mental and physical relaxation	44	58.67	III
4.	To beautify home surroundings	33	44.00	IV
5.	To attract helpful organisms	19	25.33	V
6.	To spend time with my family	12	16.00	VI
7.	To generate additional income	3	4.00	VII

For relaxation, since life is very hectic in urban cities, and employees have targets to achieve at work, leading to stress. As many were educated, they know the importance of growing gardens for relaxation. These results were similar with observations of Anitha and Amudha (2019) on comparison of benefits of terrace gardening between individual houses and apartments.

CONCLUSION

It is concluded from the study that the respondents of nutrition gardens all are involved in nutrition garden growing and from each family two members were involved. It is evident, that majority of the respondents had their own nutrition gardens, using above 750 square feet land and 75% of space for growing vegetables and fruits. It is also clear that majority of the respondents had two years of experience in nutrition garden growing and major reason growing nutrition garden was to eat organically produced food.

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CONSTRAINT ANALYSIS IN GROUP FARMING- A CASE OF FARM WOMEN GROUPS IN VEGETABLE CULTIVATION

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ABSTRACT

The objective of the study is to identify and prioritize the major constraints encountered by the farm women groups in the group process and production and marketing of vegetables and reveal various factors that affects the sustainability of farm women groups and its efficiency. The study was conducted among the selected farm women groups of Kollam district in Kerala using the *ex-post* facto research design. The respondents were farm women group members and extension facilitators from six panchayats of the district constituting a sample size of 120. Constraints were identified and ranked based on percentage analysis. Lack of working capital, storage facilities and unity of traders were the top constraints ranked. The suggestions from the study implies that working capital should be made available at the right time (95%), maintain good storage, marketing and processing facilities (90%). The study finds its relevance in current context where common lacunae in most of the strategies is the lack of regular monitoring and feedback, so it is important to analyse the constraints for amending existing strategies for its successful implementation Therefore, future interventions should take in to account the suggestions offered and should emphasis on human resource interventions that can strengthen the groups and should be capable of giving solution to these constraints.

Key words: farm women groups, constraints, group process, sustainability

INTRODUCTION

Farmer-based organizations are purportedly able to respond to the direct needs of producers, as opposed to central government agencies who often adopt top-down approaches that presume to understand farmer needs. (Kalra *et al*., 2013). Group farming by Self-Help Groups (SHGs) have enabled women in generating micro-credit, capacity building and their overall social and economic development. Apart from the measurable productivity and proûtability effects of group farming, qualitative evidence from both Telan-gana and Kerala shows that group farming has enhanced women's farming capabilities, which are likely to bring long-term economic beneûts to women's own family farms (Agarwal, 2018). Despite the initiatives for promoting self help groups, many are still in their nascent stage

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without achieving the expected results. Group sustainability is the main issue which acts as a hindrance in the way of success . SHGs are capable of attaining the resources only if the groups are sustainable. In this context, it is very important to study the constraints faced by the group members to incorporate the necessary changes in the existing interventions so as to retain the sustainability of the groups for their better performance.

MATERIAL AND METHODS

Ex-post facto research design was used for the study. The study was conducted in Kollam district of Kerala, the district is purposefully selected for its large scale cultivation of vegetables through farm women groups. The study was conducted in the selected women groups of Kudumbashree, VFPCK and ATMA. Six panchayaths were identified from Kollam district based on the number of maximum women groups and one group was selected by random sampling. Fifteen members were randomly selected from each group along with 30 extension facilitators of Kollam district which constitutes a total of 120 respondents. The constraints faced by the group members as well as the constraints perceived by the extension facilitators were studied separately.

Constraints faced by the group members

In the present study, constraint is operationalised as those difficulties faced by farm women in the process of group formation and production and marketing of vegetables. Twenty constraints faced by farm women was identified based on review and consultation with experts and reduced to 10 and the selected constraints were given for the respondents. The total frequency of agreement for each constraint was found out and the percentage of agreement of each constraint was worked out. The constraints were then ranked based on the percentage.

Constraints as perceived by the extension facilitators

Open ended questions were included in the schedule and questionnaire for extension functionaries to indicate the various constraints faced in group process

RESULTS AND DISCUSSION

Constraints faced by the farm women in group process and production and marketing of vegetables

The constraints faced by farm women were identified and presented in Table 1. From the table it is very evident that the most important constraint faced by farm women is the lack of working capital at the field centre.84% of the respondents faces difficulty because of the lack of working capital. Yet another major constraint of the farm women in vegetable cultivation is the perishable nature of the commodities and inadequate storage facility. This has been reported as a major limitation for 70% of the respondents. Strength and unity of the merchants as reported as a constraint by 64% of the farmers whereas lack of incentives was a great problem for 63% of the respondents.59% of the respondents are of the opinion that labour cost is a major problem for profitable farming and income generation. Lack of vehicle facility at the field centre was observed as an important constraint by 57% of the farmers . Lack of attendance of all members for the meeting, time delay in giving back the price of sold commodities, political influence and lack of dedicated and

Table 1. Constraints faced by farm women in the group process and production and marketing of vegetables

Sl. No	Constraints	f	%	Rank
1	Lack of working capital at the field centre	76	84	1
2	Perishable nature of vegetables and lack of storage facilities at the field centre	63	70	2
3	Strength and unity of merchants	58	64	3
4	Lack of incentives	57	63	4
5	Labour cost is a major constraint in profitable farming and income generation leading to more defaulters	53	59	5
6	Lack of vehicle facility at the field centre	51	57	6
7	Lack of attendance of all members in the meeting.	47	52	7
8	The time delay in giving back the price of sold produce to the members	44	49	8
9	High political influence limits repayment level by influential members	34	38	9
10	Lack of dedicated and effective leadership	31	34	10

effective leadership were the other constraints felt with the following percentage of respondents respectively 52%, 49%, 38% and 34%.

Suggestions offered by farm women

Authorities should ensure that the training programmes and trips arranged for the group are regularly attended by all the members of the groups (75%) . Activities should be time bound (98%). Encourage healthy competitions like melas and exhibitions to encourage women groups (82%). Group meetings should be conducted at least once in two weeks and attendance should be compulsory so that the members get updated about the functioning of the group (94%)

Suggestions of extension facilitators

Working capital should be made available at the right time, since vegetable cultivation is time bound the lack of capital can ruin the entire production activities (95%) .Vegetables are highly perishable in nature so as to obtain maximum profit through vegetable cultivation it is inevitable to maintain good storage, marketing and processing facilities (90%). Approaches like market led extension should be followed, i.e. production should be based on market demand, so that earning can be enhanced (85%). Quality seeds and planting materials should be made available to the groups through institutions like Krishibhavans and VFPCKs (88%). Awareness programmes should be encouraged since there are a good number of women who are still unaware of the benefits of women groups (96%).

CONCLUSION

From the study it can be inferred that the farm women group faces critical constraints including the basic requirements like lack of working capital, storage facilities. They also face

severe competition from the traders and lack of incentives. In spite of all this, it was also observed that the group itself is not strong, which will in turn affect the sustainability of the group itself. So, further interventions should take in to account the suggestions offered and should emphasis on human resource interventions that can strengthen the groups and should be capable of giving solution to these constraints for maintaining sustainability and attaining better performance through the groups.

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ANALYSIS OF CONSTRAINTS AMONG BENEFICIARIES IN PARTICIPATION OF MGNREGA WORKS AND THEIR SUGGESTIVE MEASURES

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ABSTRACT

More than 60 percent of total workforce in the country derives their livelihood from agriculture, during lean seasons most of the agricultural workers were not having frequent works. The MGNREGA, 2006 guarantees 100 days of wage employment in a given financial year to every rural household.For this study ex-post facto research design was employed, Salem district with sample size of 200 with 40 beneficiaries from each village were selected for the study.The identified constraints on beneficiaries in the MGNREGA are ranked by making use of Garrett's Ranking Technique. The technique was used to rank the preference mentioned by the beneficiaries on different constraints they faced.The study revealed that, continuous work not provided was ranks first with average mean score of 64.63, the identification of worksite among the official's forces them to provide work on availability.Working sites are too far away from the villages were ranks fourth constraint among the beneficiaries with average mean score of 56.06.Identification of new worksites in the village helps to provide continuous work to the beneficiaries on demand basis. Increasing wage rate to the beneficiaries will help them to carry out their livelihood activities. Providing implements to the beneficiaries will help them to carry out the assigned works effectively. The continuous provision of work for the household is provided and implementing agencies should identify the worksites in the village and prioritizing the works based on their importance.The government should revise the guidelines of works done under the MGNREGA and empowers the state government to expand the list of permissible works in the light of local conditions.

Keywords: Constraints, Garrett's,MGNREGA, Mean, Wage rate

INTRODUCTION

More than 60 percent of total workforce in the country derives their livelihood from agriculture. The high dependency on agriculturehas caused decrease in per capita household income from farm sector and use of labour-saving technologies (Mechanization) in agricultural production has resulted in lesser employment in the rural areas and causes poverty among the rural masses.An effective way

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to reduce the rural poverty could be to accelerate the work force in the rural areas, by providing continuous employment during non- agricultural seasons. In such a context of persistent poverty and unemployment scenario Mahatma Gandhi National Rural Employment Guarantee scheme (MGNREGA) was initiated to serve the people belonging to lower strata (mainly wage earners) in the society.Nearly 40 million migrants have returned to villages, there is a significant increase in demand for MGNREGA during the COVID period (Dev, S.M., 2020).This scheme provides valuable insurance against the many risks, faced by an India‘s rural poor in their daily lives and also tries to address some of the causes of poverty in rural India, by its bottom-up, demand-driven nature. It aims to empower the rural poor to help them take actions in various domains, which help them to escape poverty and decrease their material hardship. However, there were certain constraints which hamper the complete utilization of the scheme by the laborers. Hence present study was undertaken to identify the major constraints perceived by the MGNREGA beneficiaries.

Kharkwal *et al.,* 2017 found that 44 beneficiaries felt that some works are need not to be undertaken in the village, as they were not very necessary on their importance and works should be prioritized according to the requirement of village in terms of development

Table 1: Selection of study area and respondents

District	Block	Villages	Sample
Salem	Panamarathupatty	Kammalapatti	40
		Kuralnatham	40
		Nazhikkalpatti	40
		Thumbalpatti	40
		Vazhakkuttapatti	40
	Total		**200**

Table 2: Constraints faced among the beneficiaries in the participation in MGNREGA works

S.No.	Constraints	Total	Average score	Garrett Rank
1.	Low wage rate	10826	54.13	V
2.	Limitations of 100 days of employment to household	11750	58.75	II
3.	Equal wages to all beneficiaries working in one work site	11238	56.19	III
4.	Poor infrastructure provisions in the worksite	9051	45.25	VIII
5.	Some of the works are hard to do	9562	47.81	VII
6.	Inadequate provision of implements needed for job	10350	51.75	VI
7.	Working sites are too far away from the villages	11212	56.06	IV
8.	Delay in payments/ wages	4434	22.17	X
9.	No fixed work for women	8251	41.25	IX
10.	Continuous work not provided	12926	64.63	I

(Kareemulla, K., et.al., 2010). And also indicated that lack of provision of facilities in the worksite also another constraint, which is indicated by 12.5 per cent beneficiaries, because of working mothers who had young babies found it difficult to work under the scheme, due to lack of worksite facilities (Pankaj, A. and Tanka, R., 2010).RautMangeshArunrao, et al., (2019) found that major constraints faced by beneficiaries in the MGNREGA were continuous work is not provided (70.83%), Same wage rate is given for all kinds of work (60.83%) and Unemployment allowance is not provided in case of delay in job (59.16%).

MATERIALS AND METHODS

For this study ex-post facto research design was employed with sample size of 200 Beneficiaries.The village wise Beneficiaries details for the study were furnished in Table 1.

An attempt is made to recognize the constraints faced by the beneficiaries in the MGNREGA works. The identified constraints on beneficiaries in the MGNREGA are ranked by making use of Garrett's Ranking Technique. The study had the beneficiaries rank on different constraints and outcome based on their impact thereby converting into score value and rank with the help of the following formula:

$$Percent\ position = \frac{100(Rij - 0.5)}{Nj}$$

R_{ij} = Rank given for the i^{th} variable by j^{th} respondents

N_j = Number of variable ranked by j^{th} respondents

With the help of Garrett's Table, the percent position estimated is converted into scores by referring to the table given by Garret and Woodworth (1969).

RESULT AND CONSTRAINTS

The constraint is something that imposes a limit or restriction or that prevents something from occurring, the constraints faced among the beneficiaries in the participation in MGNREGA works were ranked and discussed. The table 2 shows the preference and ranking of constraints faced by beneficiaries engaged in MGNREGA works.

I. Continuous work not provided

The study revealed that, continuous work not provided was ranks first with average mean score of 64.63, the identification of worksite among the official's forces them to provide work on availability. This might be the reason for the beneficiaries not having a continuous works.

II. Limitations of 100 days of employment to household

The second constraint among the beneficiaries was limitation of 100 days of employment to the household with average mean score of 58.75. The beneficiaries having both the A & B type card holders in the family faced with the limitation of 100 days of work, both the men and women in the family were agricultural workers they having works during seasonal times and other than seasonal times they depend on MGNREGA works to carry out their livelihood activities.

III. Equal wages to all beneficiaries working in one work site

The third most constraint among the beneficiaries were equal wages to all beneficiaries working in one work site with

average mean score 0f 56.19, the humans always differ in their working capacities. The MGNREGA works gives equal wages to all working in one worksite independent of their completion of allotted work.

IV. Working sites are too far away from the villages

Working sites are too far away from the villages were ranks fourth constraint among the beneficiaries with average mean score of 56.06. The identification of worksites by officials were the major constraint, this makes the officials to identify the worksites far away from the villages.

V. Low wage rate

The beneficiaries ranked fifth constraint was low wage rate with average mean score of 54.13. The beneficiaries had constraint on low wage rate in the MGNREGA works,during seasonal times the beneficiaries getting high wage rates from agricultural and allied works.

VI. Working sites are too far away from the villages

Inadequate provision of implements needed for job ranked sixth constraint among beneficiaries with average mean score of 51.75. The beneficiaries carry their own implements to the worksite in performing their works in MGNREGA.

VII. Some of the works are hard to do

The beneficiaries ranked seventh constraint was some of the works are hard to do with average mean score of 47.81. The beneficiaries in the study area mostly well skilled in agricultural works, they lacks in performing the land development works.

VIII. Poor infrastructure provisions in the worksite

Poor infrastructure provisions in the worksite ranks eighth constraint among the beneficiaries with average mean score of 45.25. In the worksites beneficiaries lacks in the basic infrastructure provisions, this causes hurdles for the beneficiaries in carry out the work.

IX. No fixed work for women

No fixed work for women was the ninth constraint among the beneficiaries with average mean score of 41.25. Most of the beneficiaries in the MGNREGA works were women's, there is no fixed work for women. They do all the type of allotted works in MGNREGA, in some of the works they facing some hurdles to carry out the allotted work.

X. Delay in payments/ wages

Delay in payments/ wages were ranked tenth constraint among the beneficiaries with average mean score of 22.17. The delay in payment is mainly due to the uploading of their weekly work attendance in the online.

Suggestions given by the beneficiaries to overcome the constraint:

1. Providing continuous/ on demand of work for beneficiaries:

Identification of new worksites in the village helps to provide continuous work to the beneficiaries on demand basis. This makes them to do work on continuous, to carry out their livelihood activities in the non-seasonal times.

2. Increasing number of work days for households:

Providing more than 100 days of work for the household will help them to carry out their

livelihood activities. The household with A & B type card holders have limitation of 100 days of employment, increasing the number of days will help them to carry out their livelihood activities in non- seasonal times.

3. Providing wages to beneficiaries based on work performance:

Providing wages to the beneficiaries based on their work performance, the skilled workers complete the allotted work and complete additional work with effectively. Providing wages to the beneficiaries on their work effectiveness will help them to work in more enthusiastic way.

4. Identification of worksites in the village/ providing transport facilities:

Identification of worksite in the village itself will help them to assess the worksite in timely manner and use available infrastructure facilities. If the worksite is too far away from the village, the beneficiaries need arrangement of transport facilities by the panchayat to the worksite areas.

5. Increasing wage rate to the beneficiaries:

Increasing wage rate to the beneficiaries will help them to carry out their livelihood activities. The beneficiaries in the study area had high wages during agricultural seasons, in non-seasonal times they came for MGNREGA works increasing the wage rate will help them to carry out the livelihood activities.

6. Provision of implements to the beneficiaries:

Providing implements to the beneficiaries will help them to carry out the assigned works effectively. This reduces the beneficiaries in spending of additional costs for the purchase of implements for the job.

7. Provision of infrastructure in the worksite:

Providing basic infrastructure facilities and arranging basic amenities for the beneficiaries in the worksite.Similar suggestion on the establishment of crèche was also made in the studies conducted by Narayanan (2008).

8. Fixed work for women:

Providing some fixed work for the women's to perform their work effectively and provision of implements to the beneficiaries to perform the some specified works.

9, Quick transfer of wages to the beneficiaries

The delay in wages is due to the delay in uploading of the beneficiaries' weekly work attendance report in the online. They suggested that the uploading of their work attendance on time will helps them to get their wages on time.

CONCLUSION

The results concluded that, beneficiaries in the study area suggested increasing the number of days under the scheme from 100 to 150 days in rural areas, which will help them to perform their livelihood activities. The major constraints faced by beneficiaries in MGNREGA were, employment of hundred days (per household per year) is too less in the present situation. The worksites are far away from the villages and poor identification of worksiteis the major constraints among them. The poor infrastructure provisions in the worksite, no fixed work for women and delay in payments/ wages are some of the constraints, which hinder the

beneficiaries in availing the benefit of MGNREGA.The government should revise the guidelines of works done under the MGNREGA and empowers the state government to expand the list of permissible works in the light of local conditions.

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A STUDY ON CONSTRAINTS FACED BY THE AGRIPRENEURS IN TAMIL NADU

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ABSTRACT

Modern entrepreneurship is defined by the ability to take risks independently and individually in order to profit by grapping a chance to earn more money in a market-oriented economy. The main objective of the study was to identify the constraints faced by the agripreneurs and suggestions to overcome the constraints. The study has been conducted in two incubators namely Technology Business Incubator (TBI), Coimbatore and Madurai Agribusiness Incubation Forum (MABIF), Madurai. The respondents were selected by proportionate random sampling method. Garrett ranking was used to rank the constraints. The constraints were classified into three categories namely Socio personal, technological and economic constraints. The major constraints faced by agripreneurs were problems in sustaining enterprise, more psychological stress, marketing and transport of the product was difficult during Covid time, poor access of input during Covid time, lack of financial support and problems during supply chain management. Different marketing strategies could be used to make awareness among the consumers about the developed products, technical support and timely supervision.

Keywords: Agripreneurs, Constraints, Socio personal, Economic, Technological, Entrepreneurship

INTRODUCTION

Agriculture is the primary source of livelihood for about 58% of India's population. Agriculture, forestry, and fishery combined together Gross value of Rs.19.48 lakh crore (US$ 276.37 billion) to the FY20. In the FY20, agricultural and allied sectors accounted for about 17.8% of India's gross value (GVA). Entrepreneurs come in a variety of forms and sizes. Some people simply acquire things and resell them, now days in online too. Entrepreneurship is a way of analysing and addressing a need while also adding value to the stakeholders (Sharma *et al.,* 2019). Agripreneurship is the successful combination of agriculture and business. When agripreneurship is practiced in the farm, it becomes agribusiness venture. agripreneurship referred to a person's ability to identify a potential agricultural business opportunity and turn it into

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a venture that integrates innovation for a successful agribusiness (Bannor *et al.,* 2021). Neelima and Swaroop (2000) indicated that lack of family support, lower education level, lack of access to peer support, strong fear of failure, bad ridicule, lack of property and availability of collateral were the constraints faced by the women entrepreneurs. Naik *et al.,* (2018) reported that lack of market information, non-availability of input materials, high labour cost and multiple roles were the major constraints faced by the agripreneurs.

The main objective of the study is to

1. Study the constraints faced by the agripreneurs
2. Suggestions to overcome the constraints.

MATERIAL AND METHODS

The study has been conducted among the agripreneurs in the Technology Business Incubator (TBI), Coimbatore and Madurai Agribusiness Incubation Forum (MABIF), Madurai which was selected purposively. By proportionate random sampling method, 104 sample respondents were selected from the population in incubation forums. The respondents were personally interviewed and data has been collected using pre tested interview schedule.

The interview schedule consisted of constraints in major three divisions of Socio personal constraints, technological constraints and economic constraints. Garrett mean score was used to rank the constraints. The statistical tool such as Garrett ranking was used to rank the constraints.

Using Garrett's ranking technique with the following formula, the constraints perceived and the measures for improvement offered by the agripreneur in agribusiness were prioritised:

Per cent position = 100 (Rij-0.50)/nij

Where,

Rij is the rank given to ith item by the jth individual, and

Nij is the number of item ranked by the jth individual.

The percentage position of each rank was converted into score using Garrett's table. For each constraint, score of individual respondent was added together and were divided by total number of respondents for whom scores were added. Thus, the mean score for each constraint

Table 1. Socio personal constraints **(n=104)**

S. No	Socio personal constraints	G.M.S	Rank
1	Lack of consumer awareness and motivation	47.58	3
2	Lack of exposure to new innovative products	38.51	7
3	Lack of family support	41.88	5
4	More psychological stress	49.21	2
5	Problemsin sustaining enterprise	50.84	1
6	Negative attitude of society about business	44.98	4
7	Backbiting by others	41.20	6

was ranked by arranging them in a descending order.

RESULTS AND DISCUSSION

The constraints faced by agripreneurs in business had been collected and presented in the below tables. Constraints were classified into three categories namely socio-personal constraints, technological constraints and economic constraints. The Garrett ranking technique was used to rank the constraints.

The constraints faced by agripreneurs were ranked in the Table 1. It was observed that problems in sustaining enterprise were ranked first by the respondents in socio personal constraints. Because an entrepreneur might have faced challenges to sustain in the competitive market world with new innovative products based on the changing needs and demands of the consumers. Psychological stress was ranked as second. This might be due to the dual responsibility to care both the business and personal life. They also stated that lack of consumer awareness and motivation about the healthy and nutritious food products. The negative attitude of society about the business and future uncertainties might be the reason for the constraints. Lack of family support would results in stress to handle the hardships in business. Other constraints faced by them were backbiting by others and lack of exposure to new innovative products.

The agripreneurs might be given hand holding support to inspire to improve their abilities. Different marketing strategies could be used to make awareness among the consumers about the developed products. Neglecting the negative thoughts from the society might help to free from stress. In the early stage of starting a business, there was no possibility of a regular income, hence the family members felt risky, that indirectly reduced the enthusiasm of entrepreneurs. So, the entrepreneurs with great confidence, stable minds and commitment to the business can overcome the initial phase.

The technological constraints faced by agripreneurs were during covid time, marketing and transport of the product was very difficult and it was ranked as number one. Due to the complete lockdown, marketing chain completely disrupted, the products were not delivered at right time and the perishable products were not sold in time led to huge loss. Poor access and

Table 2. Technological constraints **(n=104)**

S. No	Technological constraints	G.M.S	Rank
1	Lack of proper infrastructure facilities	42.61	6
2	Lack of adequate knowledge of seasonal pest and management	42.83	5
3	Difficulty in maintaining during dearth period	45.96	4
4	Poor access of input during Covid time	47.54	2
5	Marketing and transport of the product is difficult during Covid time	49.76	1
6	Complex procedures in exporting the products	47.20	3

Table 3. Economic constraints **(n=104)**

S. No	Economic constraints	G.M.S	Rank
1	Requires high initial investment	44.98	4
2	Lack of financial support	62.55	1
3	Involvement of middle man in getting loan from bank	30.53	7
4	Problems during supply chain management	50.87	2
5	Securing working capital	48.32	3
6	Less Subsidy amount	42.61	5
7	Entire loan is not given at a time	41.20	6

non availability of inputs during lockdown time. The agripreneurs also stated that more complex producers in exporting the products and difficulties in getting certificates for exporting the products. The other constraints such as difficulty in storing the products, lack of adequate knowledge on seasonal pest and management and lack of proper infrastructure facilities were faced by agripreneurs.

It was evident that appropriate skilled labour and trained field workers were required to improve the agripreneurship knowledge and skills at the village, block, and district levels. Different organisations might provide needed training. Agripreneurs might be given technical support and timely supervision. Continuous education of technology through proper training appears to be given to the agripreneurs.

The economic constraints faced by agripreneurs were, the lack of financial support was ranked as first constraint. Because less financial support from the family background and financial institutions might create pressure among the agripreneurs. Problems during supply chain management such as sale of products in established retail markets. If the product is new, it is difficult to make aware of the products among the consumers. Securing working capital and less subsidy amount plays major role in determining the profit of the business. The other constraints such as entire loan was not given at a time which was more important in initial investment and involvement of middle man in getting loan from bank were also expressed by agripreneurs.

Agripreneurs might be getting a bank loan at a low interest rate and at a right time might help to improve the business. Aside from that, the government might make provision for grants and subsidies to encourage the adoption of research-based technologies. A variety of inputs should be provided to agripreneurs at reasonable prices, and effective training would help to increase the success of agripreneurs. The agripreneurs might be encouraged to produce the viable products based on the needs of the consumers which would help to sustain the enterprise.

CONCLUSION

In socio-personal constraints, problems in sustaining enterprise was ranked first by the respondents, followed by more psychological stress. In technological constraints, marketing

and transport of the product is difficult during Covid time was ranked first by the respondents, followed by poor access of input during Covid time. In economic constraints, lack of financial support was ranked first by the respondents, followed by problems during supply chain management. Sujata and Vandana (2008) expressed financial crises, selection, collection and storage of raw materials and marketing problems were faced by rural entrepreneurs. Agripreneurs might be inspired to learn more about new innovation technology and improve their abilities through excellent agri-preneurial development training. They might be given hand holding support to inspire to improve their abilities. Different marketing strategies could be used to make awareness among the consumers about the developed products, technical support and timely supervision. Agripreneurs might be encouraged to produce the viable products based on the needs of the consumers which would help to sustain the enterprise.

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AUGMENTING AGRICULTURAL FINANCE AND AGRIPRENEURSHIP BY PROMOTING INVESTMENT THROUGH FINTECH PEER-TO-PEER (P2P) LENDING

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ABSTRACT

Lack of investment for small and marginal farmers has caused them to resort to subsistence agriculture, small scale agriculture and labour-oriented jobs. People in rural areas who are engaged in agriculture, processing, handicrafts or allied activities can get the benefits of people's financing and crowd funding. The present paper has been written with the concept of developing a fin tech Peer-to-Peer (P2P) lending app for augmenting agricultural finance for small and marginal farmers. The unique feature of the Rural Angel app that is proposed to be developed in this project, is that it will be positioned in between a charity app and a crowd-finance/ fintech credit app. Agricultural entrepreneurs will be listed on the app as investees rather than as borrowers. They may return the invested amount fully or partially, in one go or in instalments, based on the profit they generate. Based on their repayment activity, their credit score will rise or fall. The app, once developed, will be first used to enrol a minimum of hundred potential agripreneurs, initially small to semi-medium farmers who have the ability to repay the loaned amount in quicker time, so that the morale and trust of investors is enhanced. There are multiple benefits to the agripreneurs using this app as well as the investors. The agripreneurs will get loans at low interest rate without hassles or paper work or bank formalities. They can use the micro-loans to develop their agricultural venture. The app will improve digital and financial literacy of the end users. For investors, the *Rural Angel* app provides a platform to invest their savings for possible returns in the future.

Keywords: Peer-to-Peer; Rural development; finance; investment.

INTRODUCTION

One of the major problems in agriculture that farmers in rural areas of India face, is the lack of timely and cheap financing options to carry out their farming/entrepreneurial activities. There are several microfinance institutions and Non-Banking Financial Companies (NBFCs) that have come up in the recent past to assist rural dwellers and farmers to carry out farming/self-employment (Eunjung and Jooyong, 2020). But unless agriculture becomes Agripreneurship, and farmers become agripreneurs, agricultural and

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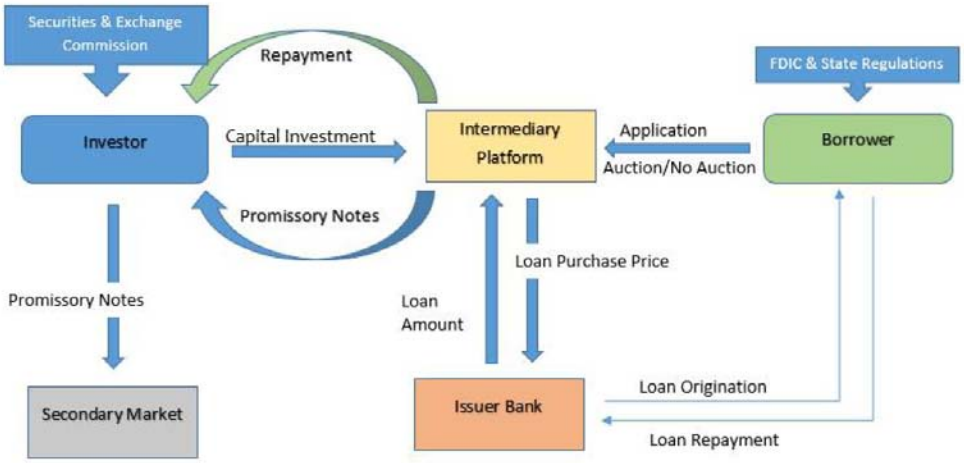

Fig.1 P2P lending model: online platform as intermediary between investor and borrower

rural development will be delayed for years to come. And for this to happen, investment from the public or 'peers' is highly essential. Lack of investment for small and marginal farmers has caused them to resort to subsistence agriculture, small scale agriculture and labour-oriented jobs (Nor Anisa, 2021). People in rural areas who are engaged in agriculture, processing, handicrafts or allied activities can get the benefits of people's financing and crowd funding, if done meticulously. There has been a boom in cryptocurrency and stock market investment apps. Thus, it was inferred that a similar concept could be used to promote rural investment as well.

Peer-to-peer (P2P) investment is a very good solution to bypass this delay and it would play a crucial role in reducing the economic and technological divide that is rising in the nation. According to the International Organization of Securities Commissions (IOSCO), an overarching business model governing the peer-to-peer lending market is the notary model.(Sasidharan,2019). Figure 1 depicts the notary Peer-to-Peer lending business model where the online platform acts as an intermediary between the investor and the borrower. A borrower visits an online platform and submits the completed application form for a loan. The borrower's risk profile is analyzed using the loan-issuing bank's underwriting guidelines, and the application is approved. The borrower's loan requirements are usually listed on the platform's website for investors to scrutinize and fund.

After obtaining sufficient investor commitments, the loan amount gets transferred to the borrower by the issuing bank(Thaker*et al.,* 2019).Once the loan is disbursed, proceeds from investors are used by the borrower to purchase the loan from the issuing bank. Investors who successfully bid the loan are technically issued a note by the platform for their value of the contribution. The notary model shifts the risk of loan non-payment away from the originating bank to the investors themselves.

After review of the available literature on P2P lending, there was no conclusive evidence of a contribution-oriented P2P app for agricultural finance. However, there have been

successful P2P apps for financing loans in general. Fintech firms such as Cred and Bharat Pe have recently launched peer-to-peer (P2P) lending offerings. Another good example is i2iFunding (RNVP Technology Pvt Ltd.) which is a Reserve Bank of India (RBI) registered Non-Banking Financial Company - Peer to Peer Lending Platform (NBFC-P2P). The mission of i2i is to provide quick credit to small borrowers at appropriate interest rates. It is developing the technology that can easily help to channel savings of general public to credit starved small borrowers. Total Loan Amount Applied by Borrowers in this platform is ₹ 9,83,45,06,070.99 and Total Investment Commitment from Investors is ₹ 1,82,66,07,005.80.

In this context, the paper has been written with the following objectives in relation to the concept of Peer-to-Peer lending in agriculture:

i. To discuss the process of development of a Fintech Peer-to-Peer (P2P) lending app for augmenting agricultural finance for small and marginal farmers.

ii. To elicit the diffusion process of the developed app among potential investors and agripreneurs.

iii. To deliberate on upscaling the app by incorporating a revenue generation model for self-sustainability

MATERIAL AND METHODOS

The main idea is to develop a peer-to-peer lending app to support the financial requirements of small and marginal farmers. The tentative name of the app could be "*Rural Angel*", to resemble angel investors in the entrepreneurial world. P2P lending targets borrowers with low- and mid-level credit ratings, a group facing reduced supply of bank loans (Jiaqi and Yucan, 2018). It is very useful for financial inclusiveness and can be a substitute for bank loans, that usually get delayed for these particular sections of community. The unique feature of the *Rural Angel* app that is proposed to be developed in this paper, is that it will be positioned in between a charity app and a crowd-finance/ fintech credit app. Agricultural entrepreneurs (referred as 'agripreneurs' from here on) will be listed on the app as investees rather than as borrowers. They may return the invested amount fully or partially, in one go or in instalments, based on the profit they generate. Based on their repayment activity, their credit score will rise or fall. Investors (general public) can view the details of individual farmers, including their landholding, crops grown, amount availed through P2P lending, amount repaid and credit score in the app. Based on these details, they can plan their future investments.

The investors will have the provision to transfer a certain amount of money to the app and use that money to invest as less as ₹ 10 into the account of a beneficiary. [Note: Consultation will have to be made with RBI regarding compliance with such a payment system as the minimum cap for already existing P2P platforms ranges from ₹ 1000 to ₹ 10,000. Under the Reserve Bank of India (RBI) rules, investors cannot lend more than ₹ 50,000 to a single borrower and a single borrower cannot borrow more than ₹ 10 lakh. The maturity of loans cannot exceed 36 months]. This implies that if 1000 people invest ₹ 10 in the name of one farmer, he would receive ₹ 10,000, which is a reasonably good amount for a small/marginal farmer, to purchase his/her seeds/fertilizers.

Similar to stock-investment where you buy and sell, by keeping regular track of the performance of companies, this is a type of micro-investment wherein you invest in the agripreneurs and keep track of their progress. P2P lending platforms do not take deposits. They only match lenders and borrowers and earn fee revenue per match. In the case of '*Rural Angel*' model, revenue will not be extracted initially. Based on the level of upscaling that occurs over time, in order to manage the functioning of the app and payment of related staff after the project funding tenure gets over, revenue at the rate of 0.5% of repayment amount (tentatively) would be extracted from the transactions/ paybacks made by agripreneurs on the app.

More than just being a micro-investment app, *Rural Angel* will be the people's agricultural and rural development app. It cannot be classified as a charity app since there are good chances that in order to improve credit score and get further investment, the farmers would repay the amount with interest (10% of the availed amount). For instance, assume that 10 P2P lenders have invested an equal amount in 10 borrowers/agripreneurs, such that each P2P lender has the same homogenous loan portfolio. So, considering that each of the 10 lenders invests ₹ 100 in each of the 10 agripreneurs' accounts, all 10 investors would have invested ₹ 1000 each and all 10 investees would have received ₹ 1000 each. Now, if one of the agripreneurs gets a profit and decides to repay ₹ 100, then at 10% interest rate, he will have an option to pay back ₹ 110; the outstanding payment for him would be ₹ 900.This ₹ 110 will be split equally among investors as ₹ 11 each. This is a simple model. Obviously, the investments and paybacks will vary from person to person.

A more complex algorithm has to be worked out in the process of the project for successful functioning of the app. Unlike regular investment apps, in this model, investors do not have the option to withdraw their deposits as it is a contribution-oriented model.

Work Plan

A Phase wise work plan of action with time line and deliverables in tabular form is provided herewith, with a plan for pilot application or trial in a realistic user environment of the technology/ product, where the expected impacts to meet end user needs are demonstrated.

Table 1: Work plan for the development and implementation of '*Rural Angel*' P2P app

Pilot application

The app, once developed, will be first used to enrol a minimum of hundred potential agripreneurs, initially small to semi-medium farmers who have the ability to repay the loaned amount in quicker time, so that the morale and trust of investors is enhanced. Once the investors are registered along with their bank accounts in the *Rural Angel* App, the next step is to accrue investments as little as ₹ 100 to as much as ₹ 5000 from investors. The transactions will be regularly monitored for ten to eleven months and regular feedback will be taken and upgradation would be implemented. PowerPoint based demonstrations will be given to both investors and investees regarding the functioning and uses of the app. A short video also will be developed and shared initially on WhatsApp to the users alone and after upscaling, on YouTube for the benefit of the general public.

Table 1: Work plan for the development and implementation of '*Rural Angel*' P2P app

Sl.No.	Task	Start	Due
1.	**Concept Development**		
1.1	Draft idea and concept	Day 1	Day 15
1.2	Draft core functions	Day 16	Day 25
1.3	Define programming language	Day 26	Day 35
2.	**Research**		
2.1	Similar apps on P2P lending	Day 36	Day 45
2.2	Existing users of Fintech lending	Day 46	Day 50
2.3	Define budget for app	Day 51	Day 55
3.	**Mockups and design**		
3.1	Create a mockup	Day 56	Day 70
3.2	Define User Interface (UI) and User Experience (UX)	Day 71	Day 85
3.3	Fix UI/UX issues	Day 86	Day 94
3.4	Hire graphic designer	Day 95	Day 105
3.5	Provide proof of concept	Day 106	Day 110
3.6	Testing and deployment	Day 111	Day 120
3.7	Solve errors	Day 121	Day 130
4.	**Promoting**		
4.1	Build landing page	Day 131	Day 135
4.2	Test landing page	Day 136	Day 142
4.3	Launch landing page	Day 143	Day 144
5.	**Development**		
5.1	Front-end development (Layout, navigation, graphics, animation)	Day 145	Day 170
5.2	Back-end development (Databases, networking, storage, user management)	Day 171	Day 200
5.3	Test Minimum Viable Product (MVP)	Day 200	Day 205
5.4	Refinement	Day 206	Day 210
6.	**Launching the app**		
6.1	Register and get approval for the '*Rural Angel*' app	Day 211	Day 220
6.2	Launch on Appstore and iOS	Day 221	Day 225
6.3	Market and popularize the app among potential investors and agripreneurs	Day 226	Day 250
6.4	Clarification and request to RBI for concession on lower limits for transactions and smoother Agri Fintech regulations	Day 251	Day 275

7.	**Improvisation**		
7.1	Surveying of users	Day 276	Day 300
7.2	Analyze app analytics and gather data		
7.3	Get feedback from users	Day 301	Day 350
7.4	Fix possible issues	Day 351	Day 365
8.	**Monitoring**		
8.1	Regular monitoring of the functioning of app, usage by investors and investees, transactions.	Day 366	Day 600
8.2	Assisting the users who face problems	Day 366	Day 600
9.	**Evaluation**		
9.1	Conducting detailed evaluation as to whether the app has achieved the objectives	Day 601	Day 615
10.	**Reconsideration**		
10.1	Review of the app's achievements and reconsideration for correcting glitches and upgrading the app for better usage	Day 616	Day 640
11.	**Revenue enhancement**		
11.1	The app will start collecting a small fee from the repayments for self-sustenance after the project period and funding gets over	Day 641	Day 675
12.	**Upscaling**		
12.1	To promote the app among investors and agripreneurs across the nation through online and offline platforms	Day 676	Day 700
13.	**Project conclusion and report submission**	Day 701	Day 720

(Table 1 contd.)

Regarding scale of operations, initially, the app can be used as a pilot for understanding the possibilities of Fintech peer to peer lending for agriculture. Therefore, once the app is developed, investors and agripreneurs will be engaged in using the app. Once the successful transaction becomes possible, it can be upscaled to other districts and states.

There are multiple benefits to the agripreneurs using this app as well as the investors. The agripreneurs will get loans at low interest rate without hassles or paper work or bank formalities. They can use the micro-loans to develop their agricultural venture. The app will improve digital and financial literacy of the end users. For investors, the *Rural Angel* app

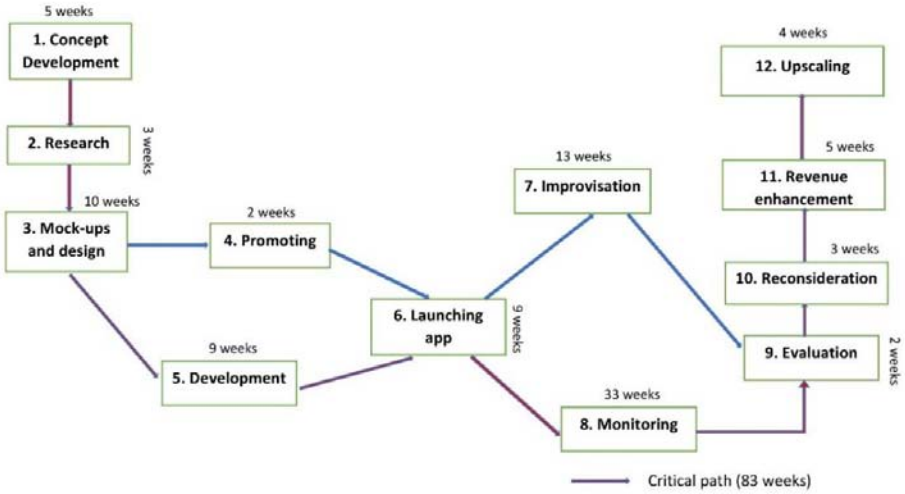

Fig.2: PERT diagram of the proposed mechanism of development of P2P app

provides a platform to invest their savings for possible returns in the future (same as in stock market apps wherein there are equal chances of the company share dropping down or rising up). They can also directly involve in the development of small and marginal farmers.

There are no environmental and ethical issues regarding usage of the Fintech App. Only one complication would be the minimum limit for investment in the app. Other fintech apps have previously used minimum limits starting from ₹ 1000. A request has to be made to RBI to permit the app in the project to allow investors to invest amounts as low as ₹ 100.

Estimated Benefits:

Though initially there will be a lot of expenditure for app development and promotion, in the long run, when large numbers of small and marginal farmers start using the app and repaying their loans with a small interest rate, considering the economy of scale, decent benefits can be expected though the ratio cannot be predicted as of now.It will help in enhancing self-employment and entrepreneurship among small and marginal farmers. The *Rural Angel* app will transform the concept of agricultural finance and associated rural development by making it much easier and more risk-free for farmers to avail micro-loans from the general public. With additional income availed from the app, farmers can go for Integrated Farming Systems and Agro-Forestry which is highly beneficial to the environment, compared to mono-cropping.

Self-sustainability of the app:

In the case of '*Rural Angel*' model, revenue will not be extracted initially. Based on the level of upscaling that occurs over time, in order to manage the functioning of the app and payment of related staff, revenue at the rate of 0.5% of repayment amount (to be finalized) would be extracted from the transactions/ paybacks made by agripreneurs on the app. The help of Government can be sought so as to promote the app's usage among agripreneurs and individual small investors across the state and later to other states, through various government campaigns and social media handles.

CONCLUSION

There are multiple benefits to the agripreneurs using the *Rural Angel* app as well as the investors. The agripreneurs will get loans at low interest rate without hassles or paper work or bank formalities. For investors, the *Rural Angel* app provides a platform to invest their savings for returns in the future. They can also directly involve in the development of small and marginal farmers. The app development and implementation process will take a few years. If it becomes a successful model in pragmatic life, this intervention can change the course of peer financing in the nation, in the context of agricultural and rural development. As discussed in the paper, a more complex algorithm has to be worked out in the process of the project for successful functioning of the app. With expert guidance and consistent efforts, it is definitely possible to make P2P a feasible option for agricultural financing.

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EXTENSION STRATEGIES FOR AGRIPRENEURSHIP PROMOTION IN TRIBAL AND RURAL AREAS IN SRIKAKULAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

Agriculture sector is one of the major livelihood option for huge section of population in India and providing ample opportunities for self employment and entrepreneurship. But agriculture in India still considered as a family tradition or livelihood option rather than enterprise.Proper reorientation to agricultural sector through crop diversification ,processing, value addition provides ample avenues for promotion of entrepreneurship among youth and women in rural and urban areas. But rapid changes occurring in the area of agriculture is creating an immense need for promotion of entrepreneurship in agricultural sector. By keeping this in view KVK, Amadalavalasa promoting agriprenuership in agriculture and allied sectors. This paper made an attempt to discuss various extension strategies such as Identifying the area for agriprenuership development, Training and skill development, Capacity building, Promotion of community based organizations, Convergence and Public Private partnerships, gender mainstreaming, bottom up planning followed for promotion of agro- based entrepreneurship among youth and women in tribal and rural areas.

Keywords: agriprenuership development, Capacity building, Promotion of community based organizations, Convergence and Public Private partnerships, gender mainstreaming, bottom up planning.

INTRODUCTION

Agriculture is the major livelihood option for majority of population in our country. Agriculture and its allied sectors namely animal husbandry, horticulture, floriculture, fisheries and sericulture is providing employment to nearly more than 50 percent of population in rural and tribal areas. India is bestowed with rich biodiversity due to its different agroclimatic zones which includes heavy rainfall areas, rivers, mountains, desserts. These agro-climatic zones provide congenial conditions for cultivation of different types of crops through the year. Buy realizing this fact, after Independence Government of India has implemented various extension programmes for enhancing the productivity in agriculture and allied sectors. As a result India achieved self sufficiency in food grains, milk production, livestock and poultry.

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India is largest producer of legumes, sugarcane, tea, Jute and spices. India secured second position in paddy wheat and vegetables. It is also 6th largest producer of fish and 5th largest producer of eggs. These statistics indicating the scope for promotion of entreprnuership in agriculture sector.

But in our country agriculture is still considered as way of life and livelihood option rather than an enterprise. But changing trends in agriculture all over the world necessitating the need for enterprise promotion in agriculture sector. Farmers need to be equipped with the required knowledge, attitude and skill to run agri related enterprises. In this context, extension organization need to play much more bigger and dynamic role to create an enabling environment for entrepreneurship development in agriculture sector. Extension organization should reorient its activities according to the changing felt and unfelt needs of the agriprenuers. A paradigm shift from production led extension to market led extension is need for making agriculture more profitable to the farmers. Continuous facilitation by extension agents on technology, inputs, grading, sorting, processing ,value addition, labeling, branding, marketing is needed for starting and sustaining agricultural enterprises. Things need to made easy for the farmers through proving facilitation on various aspects to provide customized services to agriprenuers. Extension activities to bring desirable changes in behavior of the farmers along with support services like creation of infrastructure and market services need to provided to take up entrepreneurial activities. Extension organizations should to employ various extension methods and strategies for building capacities of aspiring entrepreneurs .Multi pronged extension strategies need to be developed for providing various kinds of support services to farmers to become entrepreneurs.

By keeping this in view KVK, Amadalavalasa promoting agriprenuership in agriculture and allied sectors. This paper made an attempt to discuss various extension strategies such as Identifying the area for agriprenuership development, Training and skill development, Capacity building, Promotion of community based organizations, Convergence and Public Private partnerships, gender mainstreaming, bottom up planning followed for promotion of agriprenuership among youth and women in tribal and rural areas.

MATERIALS AND METHODS

The various extension strategies adopted by the Krishi Vigyan Kendra ,Amadalavalasa was thoughly discussed in this paper. The ex-post facto research design was followed for the study.

The present study was conducted in Srikakulam district of Andhra Pradesh.. The data were collected from primary and secondary sources for in depth study of the case. The primary data were collected by administering structured schedule, personal interview and observation. The second data was collected from records ,books and literature available.

RESULTS AND DISCUSSION

Identifying the area for agriprenuership development: Based on the crops grown in the district areas and need assessment agriprenuership was promoted to set up establishing agro processing units (eg. Millet processing units, Rice mills, Dal mills, Jaggery processing)Agro Produce

manufacturing. (Bakery, pickles) and other areas such as mushroom cultivation etc.

Training and skill development: Conducting vocational training programmes for agriprenuership promotion is one of the important mandated activity of Krishi vigyan Kendra, Amadalavalasa. Hence, KVK conducted 25 skill training vocational training programmes in the areas of processing value addition of millets, pineapple and other fruits, mushroom cultivation, nursery rising and organic farming and trained nearly 375 youth and women in tribal areas of srikakulam district from 2017-2021.

Capacity building: Capacity building is nothing but creating enabling environment for setting up of an agro based enterprise. Skill development through vocational training alone is not enough for running of successful enterprise. By keeping this in view focused on building capacities of farmers and farm women by providing facilitation services and provided food processing equipment under tribal sub plan.

Promotion of community based organizations: Community based organizations are nothing but institutionalization of people into functional groups to perform certain action. Krishi Vigyan kendra along with NABARD ,NGOs and other organizations providing support services to strengthening community based organizations.

Convergence and Public Private Partnerships (PPP): Convergence of extension organizations and stakeholders is one of the new dimensions under agricultural extension reforms in India. Coordination of various departments could bring synergy in efforts towards agriculture and allied departments. A unified and well-coordinated agricultural extension service also enables various stakeholders' resources, skills, expertise and experience to be utilized, thereby ensuring the more effective use of resources. The extension organizations with the similar objectives work together can intervene at various levels in the livelihood promotion or entrepreneurship development among rural and tribal areas. The training and extension agencies, Rural development agencies, Non government organizations (NGOs). Private organisations , Community Based organizations should implement the programmes in convergence mode for sustainable development .KVK, Amadalavalasa conducted vocational training programmes, FLDs, OFTs and other extension activities in convergence with allied departments, NGOs for promotion of agriprenership.

Gender mainstreaming: Gender mainstreaming is the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. By keeping gender mainstreaming in view, vocational training programmes on value addition of millets and pineapple ,drudgery reduction were organized for women farmers for ensuring participation of women.

Bottom up planning: Training need assessment is crucial step for organizing any kind of extension activity . KVK, Amadalavalasa is conducting PRA, group discussions, Training Need Assessment (TNA) for providing need based extension services for entrepreneurship promotion based on the felt and unfelt needs of the stakeholders.

CONCLUSION

Extension strategies such asas Identifying the area for agriprenuership development, Training and skill development, Capacity building, Promotion of community based organizations, Convergence and Public Private partnerships, gender mainstreaming, bottom up planning should be followed for promotion of agriprenuership among youth and women in tribal and rural areas.

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IMPACT OF FARMER FIRST INTERVENTIONS OF NDRI, KARNAL

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ABSTRACT

To move beyond the production and productivity, to privilege the small holder agriculture and complex, diverse and risk prone realities of majority of the farmers through enhancing farmers-scientists contact ICAR has introduced a programme called 'Farmer FIRST' .Under the farmer FIRST programme of ICAR, National Dairy Research Institute, Karnal were undertaken the project entitled "Capacity Building of Resource Poor Farmers in Paddy-Wheat cum Dairy Production System through Farmer FIRST Programme under Irrigated Agro-Eco Region of Haryana" with the crop, dairy, horticulture, enterprise and advisory based technological Interventions.The study was conducted in the farmer FIRST project area in five villages of Karnal district namely KamalpurRoran, GarhiGujran, NagalaRoran, Churni and Samoura in 2019-20.Present paper is about the economic impact of thecrop basedand entrepreneurial based interventions .The cost and returns involved and the benefit-cost ratios were also calculated. Total fourcrop and one entrepreneurialinterventions were selected. Informal' experimental design (before and-after without control design) was used. The benefit –cost ratios for the interventions were as follows: Integrated Pest Management(2.08), Integrated Nutrient Management (2.05),integrated weed management (1.97) and fodder maize production (2.36).The enterprise is running successfully.

Key words: Farmer, FIRST,Integrated, Management,Benefit-Cost ratio.

INTRODUCTION

Agriculture plays an important role in India's economy. Around 55 percent of the population is engaged in agriculture and allied activities (census 2011).The agriculture and dairying has witnessed a quantum jump in production through various extension approaches like HYVP, ICDP, IVLPetc. The farmer FIRST programme is a new approach for project development involving innovation and technology development with the strong partnership of the farmers for developing location specific, demand driven and farmer friendly technological options (ICAR, 2015). Farmer FIRST is a new concept where farmers were in central position for research problem identification, prioritization and conduct of experiments and its management in farmers' conditions.Unlike other project in case of farmer FIRST project the interventions/technology were farmers need based and localized one.We can see the farmers –scientist's interactions

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throughout the project starting from problem identification to the finding solution to the problems through interventions / technologies.The focus is on farmer's farm, innovations, resources, science and technology (FIRST).Farmer FIRST program (FFP) was implemented in the study area in 2016 to address the problemslike more pestincidents, inappropriate nutrient management and weed infestation interventions have been introduced. After the implementation of various interventions the farmers problems were addressed. So there need to be impact assessment of programs as impact assessment is intended to determine more broadly whether the program had the desired effects (both positive and negative) on individuals, households, and institutions, and whether those effects are attributable to the program intervention (Baker, 2000).The present study was undertaken to assess the economic impact of interventions introduced by the NDRI in the project area.

MATERIALS AND METHODS

The present study was conducted in the Farmer FIRST project area of NDRI, Karnal in 2019-20. Five villages namely: KamalpurRoran, GarhiGujran, NagalaRoran, Churni and Samoura from Karnal district were selected purposively. For the present study total four crop based intervention viz. Integrated Pest Management, Integrated Nutrient Management, Integrated Weed Management and Fodder Maize production were selected with total of 56 respondents and one enterprise was selected. Research design used in this study was an 'informal' experimental design (which includes before and-after without control design).For accessing the economic impact of intervention detailed interview schedule was developed according the different technological interventions. The data collected during the research was after the interventions were compared with farmer's practices in order to obtain the economic gain due to these interventions. Economic gain was calculated by using the formula Economic gain = Net returns under the intervention – Net returns under farmers practice. Benefit-cost ratio was calculated by using formula B: C ratio = Gross returns / Total expenditure.

RESULTS AND DISCUSSION

Economic Impact Assessment of Intervention

The economic impact assessment was done by calculating the cost and returns involved under different interventions. The difference in the net returns before the introduction of intervention and after the interventions will show the economic gain obtained by the farmers. We also calculated the benefit-cost ratios under each interventions.

Integrated Pest Management (IPM) in Paddy (n=14)

For effective pest management in paddy in the study area, farmers under the interventions were promoted to adopt on farm inputs at their own end. Integration of chemicals were suggested to handle diversified pest control in paddy. The expenditure involved in the paddy production wasRs. 28,025.11 per acre with average yield of 23 quintal per acre. Farmers were getting net returns of Rs.30, 282.03 per acre along with benefit-cost ratio of 2.08. Farmers obtained an economic gain of Rs. 5,000 per acre under the IPM intervention over their

Table 1. Economic Impact Assessment of Integrated Pest Management in Paddy (n=14)

Sl NO	Particulars		Cost / Returns (In Rs) per Acre
1	Total Fixed cost (A)		16,552.00
2	Total Variable cost (B)		11,473.11
3	Total Expenditures (A+B)		28,025.11
4	Yield of main product	23.00 quintal	54,050.00
5	By products		4,257.14
6	Gross returns		58307.14
7	Net returns (A)		30,282.03
8	B: C ratio		2.08
8	Net returns under farmer practices (B)		25,282.03
9	Economic gain (A-B)		5,000.00

practice. From the study, it was found that as a result of integrated pest management practices there was reduced pest infestation and increase in yield of paddy. There was increase in returns under the interventions as a result of IPM practices. The results were similar with findings of Rao *et al*. (1995),Tamizheniyan, (2001) and Begum (2018)

Integrated Nutrient Management in Wheat (n = 14)

The Continuous cultivation of paddy followed by wheat crop in the study area resulted in the imbalanced use of nutrients. Farmers under this intervention were encouraged for the use balanced nutrients in integrated manner and

Table 2. Economic impact assessment of Integrated Nutrient Management in Wheat

Sl NO	Particulars		Cost / Returns (Rs) /Acre
1	Total Fixed cost (A)		15,000.00
2	Total Variable cost (B)		10,048.03
3	Total Expenditures (A+B)		25,048.03
4	Yield of main product	24.00 quintal	45,600.00
5	By products		6,825.00
6	Gross Returns		51,425.00
7	Net returns(A)		26,377.00
8	B:C ratio		2.05
9	Net returns under farmer practice (B)		20,977.00
10	Economic gain (A-B)		5,400

Table 3.Economic impact assessment of Integrated Weed Management in Wheat

SI NO	Particulars		Cost/ Returns (Rs)/Acre
1	Total Fixed cost		14,000.00
2	Total Variable cost		10,057.54
3	Total Expenditures (A+B)		24,057.54
4	Yield of main product	22.00 quintal	41,800.00
5	By product		5,825.00
6	Gross Returns		47,625.00
7	Net returns(A)		23,568.00
8	B:C ratio		1.97
9	Net returns under farmer practice (B)		18,568.00
10	Economic gain (A-B)		5,000.00

motivated for the use of organic manures and bio-fertilizers. The expenditure involved in the Wheat production was Rs. 25,048.03 per acre with average yield of 24 quintal per acre. Farmers were getting net returns of Rs.26,377.00 per acre along with benefit-cost ratio of 2.05. Farmers obtained an economic gain of Rs. 5,400 per acre under the INM intervention over their practice. The better nutrients management and adoption of INM practices by the farmers resulted in increasedyields and returns under the intervention. The results were in line with findings of Rather & Sharma (2009).

Integrated Weed Management (IWM) in Wheat

Weed infestation especially *Phalaris minor* in wheat was major problem in the study area. Under this intervention farmers were encouraged to follow the effective weed control methods .The expenditure involved in the Wheat production was Rs. 24,057.54 per acre with an average yield of 22 quintal per acre. Farmers were getting net returns of Rs.23,568.00 per acre along with benefit-cost ratio of 1.97. Farmers obtained an economic gain of Rs. 5,000 per acre under the IWM intervention over their practice. Better weed

Table 4. Economic Impact Assessment of Fodder Maize Production (n=14)

SI NO	Particulars		Cost / Returns (Rs)/Acre
1	Total Fixed cost		14,000.00
2	Total Variable cost		10,427.29
3	Total Expenditures (A+B)		24,427.00
4	Yield of main product	20.17 quintal	42,357.00
5	Byproducts (fodder)		15,500.00
6	Gross Returns		57,857.00
7	Net returns(A)		33,430.00
8	B:C ratio		2.36
9	Net returns under farmer practice(B)		28,330.00
10	Economic gain (A-B)		5,100.00

management under the intervention leads to increased yields and returns from the wheat crop cultivation. These observations were found similar to the findings of Tiwari &Kewat(2010).

Fodder Maize Production

To have fodder production round the year farmers were provided with J-1006 maize variety seeds in Kharif and Berseem and Oats seeds during Rabi Season. The expenditure involved in the Maize production was Rs. 24,427.00 per acre with an average yield of 20.17 quintal per acre. Farmers were getting net returns of Rs.33,430.00 per acre along with benefit-cost ratio of 2.36. Farmers obtained an economic gain of Rs. 5,100 per acre under the intervention over their practice.The respondents were getting increased fodder yields from this variety compared to the other local varieties and availability of fodder was seen around the year. The findings were in line with findings of Kumar, S *et al*. (2010) and Begum (2018).

VIREN-Dairy enterprise

After obtaining the training from the NDRI in the preparation of dairy products, Mr. Yashpal from Samora village started VIREN dairy enterprise. The expenditure and returns of the enterprise for a year were calculated and the results were as follows: the total expenditure involved in running the enterprise was Rs. 2, 66,800/year and the gross returns were Rs.16, 88,400/year and the net returns were Rs. 14, 34,400/year (Table 4.32). The enterprise was established after getting training from NDRI under the enterprise and he is running the enterprise successfully with good profit.

CONCLUSION

Farmer FIRST project has helped the farmers in solving their problems with farmers-scientist interactions. From the study, we can say that the project has made good impact in the project area. Due to interventions there was increase in the crop yields .There was effective

Table 5. Cost and Returns of VIREN-Dairy enterprise

Sl.NO	Particulars	Costs/Returns(in Rs)/ Year
1	Total fixed cost	53400
2	Total variable cost	214000
3	Total cost (A+B)	266800
	Returns	
a	Dahi (@ Rs.50/kg)	54000
b	Paneer (@Rs.260/kg)	748800
c	Koha (@Rs.280/kg)	705600
d	Cream(@Rs.250/kg)	180000
	Gross Returns	1688400
	Net Returns	14,34,400

management of pest in paddy, weed management in wheat and nutrient management under wheat crop after the introduction of interventions , farmers were getting higher fodder production. These interventions have helped the farmers in increasing their incomes with higher benefit-cost ratios. The dairy enterprise is also running successfully with good returns per annum.

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CORRELATES OF ADOPTION OF TISSUE CULTURE BANANA PRODUCTION TECHNOLOGY

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ABSTRACT

The present investigation was carried out in six villages of Akot tahasil of Akola district of Maharashtra state. An exploratory design of social research was used. The said villages were selected purposively because of maximum area under cultivation of tissue culture Banana. Thus, total 120 farmers constitute the sample for the study that has experience of tissue culture Banana cultivation from the last five year. From the present study, it is observed that majority of the tissue culture banana growers (56.66 %) were observed in medium level. Whereas, (43.34%) of respondent found in the high level of adoption about tissue culture banana production technology practices. Moreover, only (16.67%) banana growers are not adopting the complete hardening of seedlings before transplanting the tissue culture banana seedling in main field. More than fifty percent (56.67%) banana growers have adopted the secondary hardening. As regard to finding of relational analysis revealed that, out of ten characteristics studied education and risk orientation are positively significant with the adoption at 0.05 level of probability. Whereas, annual income, land holding, area under banana crop, innovativeness, economic motivation, scientific orientation and sources of information were positively and highly significant correlated with adoption at 0.01 level of probability. It also observed that age of the respondents was found non significantly correlated with their adoption.

***Key words*:** Tissue culture, Banana Production Technology, Adoption

INTRODUCTION

Banana is the most important fruit crop in India and accounts for (31.7%) of the total fruit production. It is widely cultivated in varying agro climatic regions under different systems of production, India contributing (32%) of the total fruit production. Adoptions of these technologies by the banana farmers have lead to the significant growth in the banana industry. Banana is one of the oldest fruits of the world. Banana *(Musa paradisiaca*) belongs to family Musaceae and genus Musa. In India, it is grown in 880,000.00 ha. in respect of area it ranks second and first in production. In Maharashtra, banana is grown in 61031 ha with an annual production of 35,58000 MT. and productivity 58.3 MT/ha which is second highest in country. (Horticulture statistic at glance 2015 by Ministry of Agri. Govt. of India). In Akola district banana is grown in 2520.00 ha with 91980 MT. of production and tahasil wise predominate area is Akot (DSAO,

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Table 1 Distribution of the respondents according to their characteristics

Sr. No.		Category	Respondents (n=120)	
			Number	Percentage
1)		**Age (Years)**		
	i)	Young (up to 35)	13	10.83
	ii)	Middle (36 to 50)	51	42.51
	iii)	Old (Above 50)	56	46.66
2		**Education**		
	i)	Illiterate (No education)	01	00.83
	ii)	Primary school (1^{st} to 4^{th} std.)	12	10.00
	iii)	Secondary school (5^{th} to 10^{th} std.)	76	63.34
	iv)	Higher sec. school (11^{th} – 12^{th} std.)	25	20.83
	v)	College (Above 12^{th} std.)	06	05.00
3)		**Land holding (ha)**		
	i)	Marginal (up to 1.0 ha)	03	02.50
	ii)	Small farmers (1.01 to 2.0 ha)	37	30.83
	iii)	Semi-medium (2.01 to 4.0 ha)	32	26.67
	iv)	Medium (4.01 to 10.00 ha)	24	20.00
	v)	Large (Above 10.00 ha)	24	20.00
4)		**Area under Banana cultivation**		
	i)	Up to 1.0 ha	15	12.50
	ii)	1.1 to 2.0 ha.	46	38.33
	iii)	2.0 ha and above	59	49.16
5)		**Annual income (Rs.)**		
	i)	Up to Rs. 100000	03	02.50
	ii)	Rs. 100001 to Rs. 200000	38	31.67
	iii)	Rs. 200001 to 300000	22	18.34
	iv)	Rs. 300001 to 400000	21	17.50
	v)	Rs. 400001 and above	36	30.00
6)		**Economic motivation**		
	i	Low (up to 20)	18	15.00
	ii	Medium (21 to 26)	79	65.83
	iii	High (27 and above)	23	19.17
			Mean= 23.90	SD= 3.34
7)		**Innovativeness**		
	i	Low (up to 20)	18	15.00
	ii	Medium (21 to 26)	79	65.83
	iii	High (27 and above)	23	19.17
			Mean= 23.90	SD= 3.34
8)		**Risk orientation**		
	i	Low (up to 13)	26	21.67
	ii	Medium (14 to 22)	68	56.66
	iii	High (23 and above)	26	21.67
			Mean= 18.15	SD= 4.93

9)		**Scientific orientation**		
	i	Low (up to 17)	17	14.17
	ii	Medium (18 to 23)	82	68.33
	iii	High (24 and above)	21	17.50
			Mean= 20.87	SD= 3.02
10)		**Sources of information**		
	i	Low (up to 8)	25	20.83
	ii	Medium (9 to 15)	70	58.34
	iii	High (16 and above)	25	20.83
			Mean= 12.03	SD= 3.84

Akola district). It is also a good source of potassium, phosphorus, calcium and magnesium. The fruit is easy to digest, fat free and cholesterol free.

MATERIAL AND METHODS

An exploratory design of social research was used in the present investigation as the study aimed at ascertaining the adoption of farmers and to identify the production constraints in cultivation of tissue culture banana growers in the selected village. The present investigation was carried out in the six selected villages of Akot tahsils of Akola district. The said villages were selected purposively because of maximum area under cultivation of tissue culture Banana. From each village, twenty farmers were selected randomly who cultivated the tissue culture Banana from last five years. Thus, total 120 farmers constitute the sample for the study. The interview schedule was used for data collection. The data were collected through the personal interview schedule and analyzed.

RESULT AND DISCUSSION

The results obtained from the analysis of the data in accordance of the study objectives along with the logical discussion have been given to interpret the observed phenomena.

It is noted from the table 1 revealed that, the majority of the respondents were found in the old age category i.e. (46.66%) with the maximum education up to the secondary school (63.34 %), majority of tissue culture banana producer belong to marginal and semi-medium category i.e 30.83 and 26.67 percent, respectively. Relatively one third of respondents (31.67 %) had annual income range from Rs.100001 to 200000/-. Whereas, the majority of the respondent (65.83%) having medium level of economic motivation, more than half of respondents (55 %) were having medium level of innovativeness followed by majority of the respondents had medium to high level of risk orientation i.e. 21.66 percent to 56.66 percent. Whereas, the majority of respondent (68.33%) had medium scientific orientation as well as 58.34 per cent of respondent had medium sources of information to get desired information tissue culture banana production technology.

From the table no. 2 revealed that, partial adoption of tissue culture banana cultivation technology practices near about fifty percent and above respondents adopted hardening practices, intercultural operation, pest and diseases control, making smoke/ Irrigation during night hours to protect from cold orchard and

I. Practice wise adoption of tissue culture Banana growers.

Table 2: Distribution of respondents according to their practice wise adoption of tissue culture banana cultivation

SN	Banana production technology practices	Adoption (n=120)		
		Complete	Partial	Non
1	**Soil type**	63 (52.50)	41 (34.17)	16 (13.33)
2	**Varieties** (G9)	92 (76.67)	28 (23.33)	00 (00.00)
3	**Hardening:** First hardening upto 45 days (by company) and second hardening for 45 day in shade net	32 (26.67)	68 (56.66)	20 (16.67)
4	**Time of planting:** Recommended time of planting Mrug bag (June-July) and Kande bag (Oct. - Nov.)	97 (80.83)	23 (19.17)	00 (00.00)
5	**Spacing :** (1.5 X 1.5mt.)	37 (30.84)	81 (67.50)	02 (01.66)
6	**FYM:** Quantity of organic manures recommended for banana per ha.(50-60tons/ha.)	24 (20.00)	81 (67.50)	15 (12.50)
7	**Intercultural operation:** Earthing-up, cutting of side suckers, propping.	51 (42.5)	62 (51.66)	07 (05.84)
8	**Chemical fertilizers:** Quantity of chemical fertilizer required per plant. (200:40:200 gm./plant)	37 (30.83)	76 (63.34)	07 (05.83)
9	**Irrigation:**			
10	Summer- 12 -14 lit./plant	31 (25.83)	89 (74.16)	00 (00.00)
11	Winter- 6 - 8 lit./plant	17 (14.16)	100 (83.33)	03 (02.50)
12	**Plant protection measures**			
13	**Pest:**			
	Aphid – Dimethoate 30%EC 10 ml./10 lit. of water or Phorate 10% CG 25 gm. / plant or Carbofuran 3% CG 166 gm./plant or Oxydemton methyle Malathion 25%EC 20ml. /10 lit of water. Rhizome weevil - Carbofuran 3% CG 166 gm./plant or Quinolphos 25 % EC 20ml./10 lit of water.	22 (18.33)	66 (55.00)	32 (26.67)
14	**Diseases:**			
	Leaf spot or Sigatoka - Mancozep 75% WP 3 gm / lit of water or Copper Oxychloride 50% WP 3gm. /lit. of water Banana bunchy top virus: The aphid should be controlled to check spread of the disease by spraying Dimethoate 30% EC 10 ml./10 lit. of water or Phorate 10% CG 25 gm. / plant or Carbofuran 3% CG 166 gm./plant or Oxydemton methyle Malathion 25%EC 20ml. /10 lit of water	27 (22.50)	62 (51.67)	31 (25.83)
15	**Use of wind break:**	52 (43.34)	61 (50.83)	7 (05.83)
16	Making smoke/ Irrigation during night hours to protect from cold orchard.	24 (20.00)	67 (55.83)	43 (35.83)
17	**Harvesting:** (110 to 120 days after flowering)	51 (42.5)	60 (50.00)	09 (7.5)

Table 3. Distribution of respondents according to the extent of adoption of tissue culture banana production technology.

Sr. No.	Category	Respondents (n=120)	
		Number	Percentage
1	Low (Upto 33.33)	15	12.50
2	Medium (33.34 to 66.66)	68	56.66
3	High (66.67 and above)	37	30.84
	Total	**120**	**100.00**

Table 4: Relationship between selected characteristics of farmers with their adoption about tissue culture banana cultivation practices.

Sr. No.	Variables	'r' value
1	Age	0.1569^{NS}
2	Education	0.1881*
3	Annual Income	0.6193**
4	Land holding	0.4524**
5	Area under Banana crop	0.4498**
6	Innovativeness	0.3121**
7	Risk orientation	0.1946*
8	Economic motivation	0.4174**
9	Scientific orientation	0.4370**
10	Sources of information	0.5023**

*, **Significant at 0.05 and 0.01 at level of probability, respectively.

propping followed by, irrigation schedule during summer and winter season i.e. 65.83 per cent and 83.33 per cent, respectively. Equally adoption of spacing and FYM is 67.50 per cent; harvesting (42.50%), soil type (34.17%), selection of varieties (23.33%) and lastly time of planting only (19.17%) were found partial adoption of respondents about tissue culture banana cultivation practices. In case of non-adoption of tissue culture banana cultivation technology, nearby one third of respondents were not adopting the practice of control of pest (26.67%), diseases (25.83%), harvesting (31.67%), making smoke/ Irrigation during night hours to protect from cold orchard (35.83%) followed by soil type (13.33%), hardening practices (16.67%), use of FYM only (12.50%)

II Adoption level

It is observed from table 3 that, most of the respondents (56.66%) had medium level of adoption of tissue culture banana production technology. The percentage of respondents having high level of adoption was (43.34%) whereas; only (12.50%) of respondent found in low level of adoption.

It is evident from table 4 that, among the selected variables education and risk orientation are positively significant with the adoption at 0.05 level of probability. Whereas, annual income,

Table 5: Constraints faced by the respondents in adoption of tissue culture banana cultivation practices.

SN	Constraints	Frequency	Percentage
1	Maximum yield of second grade quality hands in the tissue culture Banana plants	117	97.50
2	Mortality found in the main field after the transplanting due to non-adoption of hardening practices.	99	82.50
3	Expenditure on gap filling is increases due to mortality	100	83.33
4	High cost of tissue culture seedling.	117	97.50
5	Completed harden seedling are not provided by the supplier	109	90.83
6	Maximum expenditure on propping in tissue culture plants	97	80.83
7	Low yield shown in tissue culture ratoon crop	93	77.50

land holding, area under banana crop, innovativeness, economic motivation, scientific orientation and sources of information were positively and highly significant correlated with adoption at 0.01 level of probability. It also observed that age of the respondents was found non significantly correlated with their adoption.

Constraints

Constraints faced by the Banana growers in adoption of tissue culture banana production technology practices presented in table 5 are as follows.

Data pertaining to constraints experienced by tissue culture banana growers in cultivation of banana are presented in table 5. The majority of respondents (97.50%) express the major constraints in the production of tissue culture banana were high cost of tissue culture seedling and maximum second grade quality hands produced in tissue culture plants. 90.80 per cent of growers express the major constraints in the production of tissue culture banana were maximum yield of second grade quality hands in tissue culture Banana plants. Whereas, complete hardening seedlings are not provided by the supplier (90.83%), maximum expenditure on propping in tissue culture plants (80.83%), low yield shown in tissue culture ratoon crop (77.50%) were expressed by the sample respondents of tissue culture banana growers. whereas, mortality has been found in the main field after the transplanting due to non-adoption of hardening practices was reported by (82.50%) respondents.

CONCLUSION

From the present study, it can be concluded that (56.66%) of them were observed in medium level of adoption of tissue culture banana production technology practices.

Moreover, it is also found that (16.66%) banana growers are not adopting the complete hardening of seedlings before transplanting the tissue culture banana seedling in main field. More than fifty percent (56.67%) banana growers have adopted the secondary hardening partially. Among the selected variables education and risk orientation are positively significant with the adoption at 0.05 level of probability. Whereas, annual income, land holding, area under banana crop, innovativeness, economic motivation, scientific orientation and sources of information were positively and highly significant correlated with adoption at 0.01 level of probability. It also

observed that age of the respondent was found non-significantly correlated with adoption.

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AN ANALYSIS OF INFORMATION SEEKING BEHAVIOR OF ARECANUT FARMERS IN TAMIL NADU

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ABSTRACT

Arecanut (*Areca catechu*) is one of the important cash crop in India and it is noted from the pre-vedic period. India ranks first in terms of both area and production of arecanut and also accounts of 49.74 per cent of its world production. In Tamil Nadu arecanut is cultivated in 6,884 ha of area. This study was purposively conducted in Salem district of Tamil Nadu. This district occupies first position in area (2,421 hectares) of arecanut in Tamil Nadu and constitutes 35.16 per cent of arecanut area under Tamil Nadu.The sample size of 120 arecanut farmers was selected for the study by using proportionate random sampling technique. Most of the arecanut farmers (79.17 per cent) had medium to high level of information seeking behavior. Arecanut farmers had frequent level of seeking information's from the non-institutional sources with a means core of 65.5 followed by media sources with a mean score of 36.33.The occasional level of seeking of information among the arecanut farmers with the mean scores for different sources were, institutional sources with mean score of 46, media sources (42.67), non-institutional sources (37) and other sources with a mean value of 19. Institutional, Non-institutional, Media and Other sources plays an important role in dissemination of arecanut cultivation practices among the farmers. The results shows that nearly two-third of the arecanut farmers seeks information frequently from agricultural leaders (60.80 per cent) and progressive farmers (60.00 per cent) on cultivation practices of arecanut. The farmers have need of further information about different aspects of crop production, marketing of agricultural products and so on.The information generated by these sources should be communicated in localized languages and technologies easily understood by arecanut farmers.

Keywords: Arecanut, Farmers, Information seeking, Institutional, Media, Salem.

INTRODUCTION

Arecanut (*Areca catechu*) is one of the important cash crop in India and it is noted from the pre-vedic period. Arecanut is widely used by the Hindus in religious rites of birth, marriage, and also in nuptial ceremonies. The major arecanut growing countries in the world are India, China, Myanmar, Indonesia, Thailand and Bangladesh. India ranks first in terms of both area and production of arecanut and also accounts of 49.74 per cent of its world production (FAO, 2017). In India arecanut is majorly

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cultivated in Karnataka, Kerala, Meghalaya, Tamil Nadu, West Bengal and Assam. Three states namely Karnataka, Kerala and Assam constitute 88.59 per cent of total production of the country. In Tamil Nadu arecanut is cultivated in 6,884 ha of area. The major arecanut growing districts are Salem, Coimbatore, Namakkal, Erode, Nilgiris and Dharmapuri. Salem district accounts first in terms of area (2,421 hectares) under arecanut cultivation. More than 30,000 farm workers including women also engaged directly or indirectly in harvesting and processing of nuts in Salem district (Ananth, M.K., 2016). This article helps to know their information sources on arecanut cultivation, for impart the future trainings and demonstrations in the arecanut cultivation.

MATERIAL AND METHODS

This study was purposively conducted in Salem district of Tamil Nadu. This district occupies first position in area (2,421 hectares) of arecanut in Tamil Nadu and constitutes 35.16 per cent of arecanut area under Tamil Nadu. Salem district consists of 20 blocks. From this district Peddanackenpalyam, Valapddy, Gengavalli and Attur blocks were selected based on the 87.28 per cent of area under arecanut in this district. The sample size of 120 arecanut farmers was selected for the study by using proportionate random sampling technique.

The collected data were analysed with the help of percentage analysis, cumulative frequency method and mean comparison.

RESULT AND DISCUSSION

Overall Information seeking behavior:

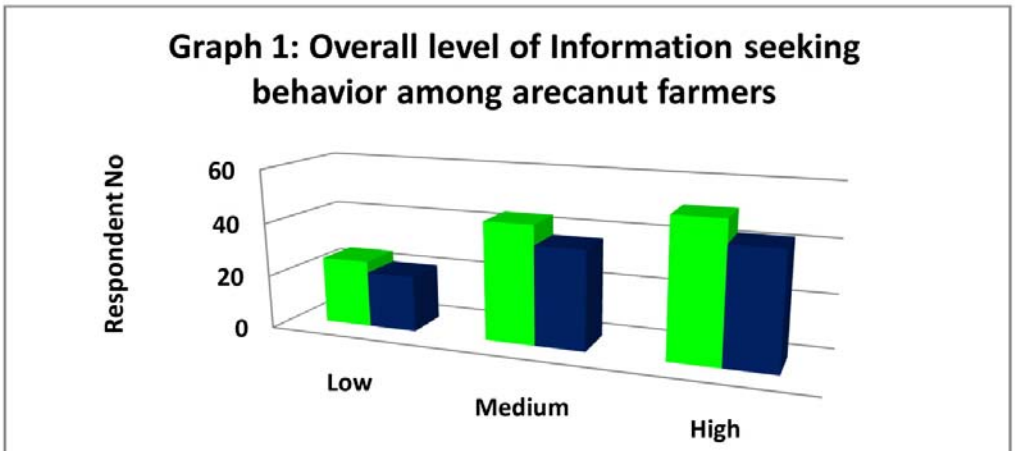
Information seeking behavior influences the knowledge and adoption level of recommended technologies in arecanut cultivation. This is an era of information explosion and they seek information from various sources viz., Institutional sources, Non-institutional sources, Media sources and other sources.

From the graph 1 it could be concluded that more than two-fifth of the arecanut farmers (42.50 per cent) had high level of information seeking behavior followed by more than one-third of the arecanut farmers (36.67 per cent) had medium level of information seeking behavior and rest of them (20.83 per cent) had low level of information seeking behavior. It could be concluded that most of the arecanut farmers (79.17 per cent) had medium to high level of

Table no: 1 Distribution of arecanutfarmers in the selected blocks

S.no	Name of blocks	Number of arecanut farmers	Sample selected by Proportionate Random sampling technique
1.	Peddanackenpalayam	1050	52
2.	Valapady	715	36
3.	Gengavalli	420	21
4.	Attur	220	11
Total		2405	120

(Source: Assistant Director of Horticulture office Peddanackenpalayam, Valapady, Gengavalli, Attur).



	Low	Medium	High
Number	25	44	51
Per cent	20.83	36.67	42.5

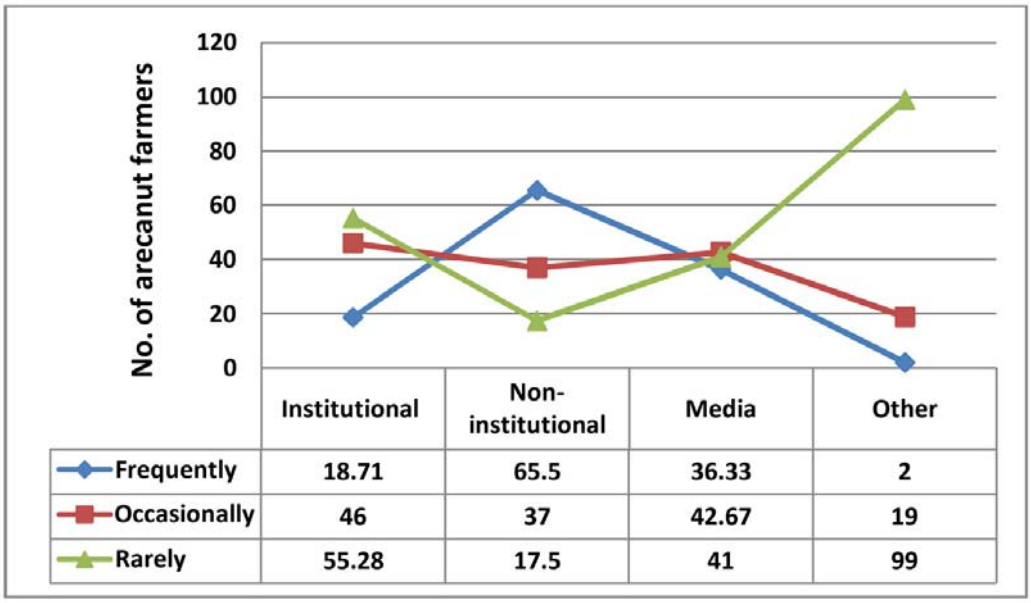
information seeking behavior. These findings are in line with findings of Shindhu (2015) who also reported that medium to high level of extension agency contact.

It could be inferred that Horticultural Officer, Assistant Horticultural Officers, representatives of private agencies were the most important institutional sources for seeking the information on improved practices and technologies among the arecanut farmers. The reliability and trust-worthiness placed upon friends, relatives, input dealers and neighbors would have them made as the important Non-institutional sources of seeking information by the arecanutfarmers. The popularity and availability of television, social media, radio and print media were the media sources for seeking of information bymost of the farmers. The demonstrations and exhibition made the important contribution in the other sources. These findings are in line with findings of (Dhara, 2010;Jergin, 2014; Sajeev and Saroj, 2015)

.Comparison of different sources of information seeking among arecanut farmers

The results shows that, the arecanut farmers had frequent seeking of information's from the non-institutional sources and ranked first among the information sources with a means core of 65.5 followed by media sources with a mean score of 36.33. An institutional source was ranked third in the seeking of information with a mean score of 18.71, followed by other sources with a mean score of 2.The occasional level of seeking of information among the arecanut farmers with the mean scores for different sources were, institutional sources with mean score of 46, media sources (42.67), non-institutional sources (37) and other sources with a mean value of 19. In the occasional level of seeking information the institutional sources plays an important role in the seeking of information. The arecanut farmers seek information rarely from the different sources

.Comparison of different sources of information seeking among arecanut farmers



	Institutional	Non-institutional	Media	Other
Frequently	18.71	65.5	36.33	2
Occasionally	46	37	42.67	19
Rarely	55.28	17.5	41	99

Graph 2: Different sources of information seeking among arecanut farmers

based on the mean scores was, other sources with a mean score of 99 followed by institutional sources (55.28), Media sources (41) and non-institutional sources (17.5). Because the other sources like exhibition, agricultural films, agricultural meetings and demonstrations, these events are takes place occasionally. This might be the reason for the seeking of information from other sources in a rare manner.

A. Institutional Sources

In the institutional sources, the results shows that only meager percentage of arecanut farmers had frequent level of contact for seeking information from Deputy Director of Horticultureand Agricultural university scientists (0.80 %), followed by Assistant Director of Horticulture (2.50 %).The arecanut farmers seek information's occasionally from the Deputy Director of Horticulture and Agricultural university scientists (13.30 %), followed by Assistant Director of Horticulture (39.20 %). The 20.80 per cent of arecanut farmers frequently seeking for information's on scheme, production and marketing from Horticultural Officers, followed by 55.00 per cent of the arecanut farmers meets occasionally for seeking the information's. From Assistant Horticulture Officer 40.00 per cent of the arecanut farmers seeks frequently of information's on schemes, production, processing and marketing aspects of arecanut, followed by 46.70 per cent of them meets occasionally. More than one-third of the arecanut farmers (35.00 %) seek frequently from representatives of private agencies for application of fertilizers and plant protection measures in their farms, followed by 56.70 per cent seeks occasionally from the representatives of private agencies. The 9.10 and 44.20 per cent of arecanut farmers seeks frequently and occasionally from bank officials on crop loans.

Table 2:Information seeking behavior of arecanut farmers

S.No.	Information seeking behavior	Frequently		Occasionally		Rarely	
		Number	Per cent	Number	Per cent	Number	Per cent
A.	**Institutional Sources**						
1.	DDH	1	0.80	16	13.30	103	85.90
2.	ADH	3	2.40	47	39.20	70	58.40
3.	HO	25	20.80	66	55.00	29	24.20
4.	AHO	48	40.00	56	46.70	16	13.30
5.	Agrl. University scientist	1	0.80	16	13.30	103	85.90
6.	Representatives of private agencies	42	35.00	68	56.70	10	8.30
7.	Bank officials	11	9.10	53	44.20	56	46.70
B.	**Non-Institutional sources**						
1.	Agrl. Leaders	73	60.80	40	33.40	7	5.80
2.	FDG Conveners	5	4.20	27	22.50	88	73.30
3.	Progressive farmers	72	60.00	44	36.70	4	3.30
4.	Contact farmers	93	77.50	23	19.20	4	3.30
5.	Friends	100	83.30	19	15.80	1	0.80
6.	Relatives	97	80.80	21	17.50	2	1.70
7.	Input dealers	31	25.80	67	55.80	22	18.40
8.	Neighbors	62	51.70	55	45.80	3	2.50
C.	**Media sources**						
1.	Television	73	60.80	44	36.70	3	2.50
2.	Radio	8	6.70	76	63.30	36	30.00
3.	Print media	28	23.30	8	6.70	84	70.00
4.	Social media	91	75.90	19	15.80	10	8.30
D.	**Other sources**						
1.	Trail plot	5	4.20	27	22.50	88	73.30
2.	Agrl. Meetings	1	0.80	46	38.30	73	60.80
3.	Demonstrations	2	1.70	28	23.30	90	75.00
4.	Tour / field trips	2	1.70	4	3.30	114	95.00
5.	Agrl. Films	1	0.80	1	0.80	118	98.30
6.	Exhibition	1	0.80	8	6.70	111	92.50

B. Non-institutional sources

The results shows that nearly two-third of the arecanut farmers seeks information frequently from agricultural leaders (60.80 per cent) and progressive farmers (60.00 per cent) on cultivation practices of arecanut, followed by occasionally of agricultural leaders (33.40 per cent) and progressive farmers (36.70 per cent). The 4.20 and 22.50 per cent of arecanut farmers seek information's frequently and occasionally

from FDG conveners. One-fourth of the arecanut farmers seek information from friends (83.30 %) and relatives (80.80 %) frequently, followed by occasionally viz., friends (15.80 %) and relatives (17.50 %). More than half of the arecanut farmers (55.80 %) seek information occasionally from input dealers on application of fertilizers and plant protection measures of arecanut, followed by one-fourth (25.80 %) of the farmers seeks frequently from the input dealers. 51.70 and 45.80 per cent of arecanut farmers seeks information on cultivation practices frequently and occasionally from the neighbors.

C. Media Sources

In the media sources, three-fourth of the arecanut farmers (75.90 %) of the arecanut farmers seek information frequently from social media, followed by 15.80 per cent seek occasionally. Social medias like, whatsapp, facebook and instagram plays an important role in dissemination of agricultural information to the farmers, arecanut farmers seek information from these sources and sharing the information to their fellow farmers also. Three-fifth of the arecanut farmers(60.80 %) seek information frequently from the Television programmes followed by occasionally by 36.70 per cent. This is due to that fact most of the arecanut farmers in the study area had smart phones and also they are regularly watching the agricultural TV programmes, this might be the reason for the frequent and occasional seeking of information from the TV programme and Social media. The meager percentage of arecanut farmers (6.70 %) seek frequently on radio programmes relating to agriculture followed by 63.30 per cent seek occasionally. Nearly one-fourth of them (23.30 %) seek information from the print medias, followed by 6.70 per cent occasionally.

D. Other Sources

Meager percentage of arecanut farmers seek information frequently on improved practices through Agricultural meetings, Agricultural films and Exhibition (0.80 %) followed by Tour/Fieldtrips and Demonstrations (1.70 %) and Trail plot (4.20 %). The occasional seeking of information on improved practices through Agricultural meetings (38.30 %), Demonstrations (23.30 %), Trail plots (22.50 %), Exhibition (6.70 %), Tour/Fieldtrips (3.30 %) followed by Agricultural films (0.80 %).The other sources of information like exhibitions, agricultural-films and tour/fieldtrips are conducted by state departments, state agricultural universities, other non-governmental and voluntary organizations. They are conducting these programmes occasionally, this might be the reason for the low level of seeking of information from the other sources.

CONCLUSION

The study concludes that, Institutional, Non-institutional, Media and Other sources plays an important role in dissemination of arecanut cultivation practices among the farmers.The farmers have need of further informationabout different aspectsofcrop production, marketing of agricultural products and so on. So, it is necessary to ensure adequate information supply to the farmers for their betterment as well as for the betterment of agriculture. The arecanut farmers had frequent seeking of information's from the non-institutional sources and followed by institutional sources. The popularity and availability of social media were

the media sources for seeking of information bymost of the farmers. The informationgenerated by these sources should be communicated inlocalized languages and technologies easily understood by arecanut farmers. New and innovative means of communication should be used fordissemination of relevant information on variousaspects of arecanut production to farmers.

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ICT FOR WOMENT EMPOWERMENT: REALIZATION AT GLOBAL AND NATIONAL LEVEL

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ABSTRACT

Information and Communication Technology abbreviated as “ICT” play a crucial rolein today’s society. The abbreviation “ICT” became popular after it was used in 1997 and is transforming the way of living since then. UNESCO (2002) defines Information and Communication Technologies (ICTs) as a diverse set of technological tools that create, disseminate, store, bring value addition and manage information. Over the past few decades ICT have been recognized as the potent tool for promoting sustainable development along with empowering and building capacities of vulnerable sections of society. Access and utilization can enable women and men to gain a stronger voice both at community and national level. However, access to the internet and other forms of ICT, like mobile phones, laptops and coloured television, varies from men to women and between urban and rural communities. The urban India has been enjoying the benefits of this revolution on the other arm the rural India is still to take the benefits. Moreover, when we throw an eye on ICT revolution from the context of gender, we witness that it has not been passed on to the womenfolk primarily due to the social structure, values and beliefs of the Indian society. (Kabeer, 2000). This has been attributed to the existing gender inequality between men and women and off course the need for empowerment of women at all levels is currently felt. Research studies reveal that ICT to a greater extent have been successful in empowering women. This conceptual paper highlights the role of ICT in fostering women empowerment. The paper presents a brief review of realization of ICT as a tool for women empowerment at national and international level. Further detailing the framework and models proposed by researches and constrains in the usage and access of ICT by women.

INTRODUCTION

Information and communication technologies abbreviated commonly as ICTs have catalyzed communication and networking between and among people on a global scale that has lead to a significant stage of development in the history of human communications. ICT is a broad subject and the concepts are still evolving that comprises of diverse segments such as telecommunications, television and radio broadcasting, computer hardware, software services and electronic media etc. International Federation of Global & Green Information Communication Technology defines Information and communications technology (ICT) as an extensional term for information

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technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers.

India is considered as a pioneer in software development and a favourite destination for IT-enabled services and is currently the world's second-largest telecommunications market with a subscriber base of 1.18 billion. India already has 250 million digital screens, including smartphones, tablets, laptops and desktops; traditional TV video is consumed by 82 percent people (Boston Consulting Group -BCG report, 2017). The internet penetration rate in the country stood at around 50 percent in 2020.The production of mobile phones has gone up from about 6 crore mobile phones in 2014-15 to approximately 33 crore mobile phones in 2019-20 (Statista Research Department Report, 2021).

ICTs as information carriers have the ability to revolutionize the facilitation of information and knowledge to improve access and expand opportunities for upliftment and empowerment. (Chapman & Slaymaker, 2002). Even after ICT being available at the first place, gender discrimination in utilization and access to ICT does not foster women's upliftment and empowerment in particular. The urban India has been enjoying the benefits of this revolution; however the rural India is still to take the benefits.

How far have been ICTs successful in equalizing the benefits they provide? Are the benefits positive in every aspect? How potent are ICTs to promote women's rights and empowerment? These questions are central to the review of literature.

MATERIAL AND METHODS

A systematic review of literature was conducted to identify and appraise the following issues

a. Concern of digital divide

b. How do accessibility, use and ownership of ICTs differ for women

c. How ICTs have been potent tool for women empowerment by studying the frame works and models proposed by researchers.

DIGITAL DIVIDE

India is a country of grand contradictions. Even being a global leader in the knowledge economy, it houses more than half the world's poor and illiterate people, most of whom are women. The sex ratio improved from 933 in 2001 to 940 in 2011. The gender gap between male (82.14%) and female (65.4%) reduced but the illiteracy rates remain high. It is an

important fact that progress of a society is not possible unless women are given equal opportunities as men. Forty three percent of Indian men own a cell phone, women lag behind with only twenty eight percent mobile ownership. (Ministry of communications, GOI, 2019). Female usage of computers in India is still less than men and mobile ownership is also less. (Aneja & Mishra , 2017). Henceforth it is evident that there is a digital gap concerning ICTs and women. Literature cites following types of gap in ICT usage by women:

In the way of marching for equal rights and fighting for their rightful place women face many challenges such as:

- Patriarchy and social pressures

- Caste based discrimination and social restrictions
- Inadequate access to resources
- Over-represented in part-time work force, and often remain within low-income bracket
- Decisions on education, marriage of children and market related transactions in major assets remain with the men
- Unequal power relations between women and men
- Lesser number of women accessing and using ICT as compared to men

WOMEN EMPOWERMENT: REALIZATION AT GLOBAL & NATIONAL LEVEL

United Nations Development Fund for Women (2009) defines Empowerment as gaining the ability to generate choices and exercise bargaining power, and developing a sense of self- worth, a belief in one's ability to secure desired changes, and the right to control one's life. Huyer and Mitter (2003) reported that the use of ICT can lead to upliftment of women by providing better access to information about income, education opportunities, and health related issues that in turn help them to become a better version of themselves. Huyer and Sikoska (2003) observed that the income and knowledge from ICT sector enable women to undertake independent decisions and make suitable choices about their lives. Menon (2006) advocated that, for women, ICTs bridge a new social change and provide opportunities to women by advancing new social roles, breaking out of traditional orthodoxies, by carring out jobs as software engineers, knowledge workers, 'infomediaries', telecentre operators and social entrepreneurs. Chattu *et al.* (2013) highlighted the role of mobile technology in the field of women empowerment and stated that not only for communication, women are also using the mobile for different ways: to be safe in times of difficulty, as a media connector with current updates in day to day and as an e-learning device to become literate and get empowered.

Table 1: Represents a list of activities and events for empowerment of women at global and national level. Literature cites various frameworks that explain the levels of empowerment of women. The one called Longwe's Women Empowerment Framework (1994) quotes five levels of women empowerment.

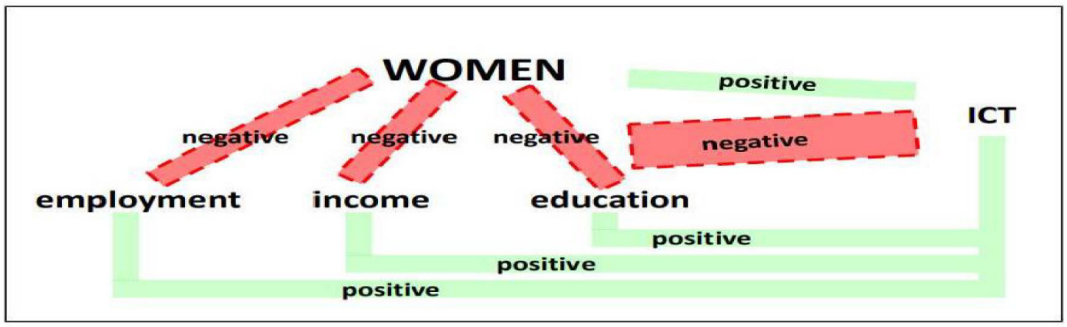
Hilbert (2011) conceptualized a model for fighting longstanding discrimination with digital means. He stated that through ICTs women can develop positive attitude to fight inequalities. The model is presented below:

Table 1: Represents a list of activities and events for empowerment of women at global and national level.

Serial no.	Activity/event	Place, year	Description
1.	United Nations forth conference on women	Beijing 1995	Cornerstone in promotion ofwomen's rights to equal share of ICTs.
2.	The Action Plan of the United Nations Information And Communication Technologies Task Force	Adopted in 2001	The disabled and people living in poverty in general can beleveraged and enhanced with ICT
3.	World Summit on the Information Society (WSIS) conference	Geneva 2003	Milestone; declared that development of ICTs provide enormous opportunities for women
4.	Convention on Elimination of all forms of Discrimination against women (CEDAW)	United nations 1979	India is bound to take series of measures to end discrimination against women.
5.	National policy for women	India 2001	Emphasized removal of disparities in access to and proficiency in use of ICTs.
6.	Sustainable Development Goals: Target 5	2015	Achieve gender equality and empower all women and girls.

Table 2: Representing levels of empowerment stated by Longwe.

Levels of empowerment	Description
Control	Women and men have equal control over factors of production and distribution of benefits, without dominance or subordination.
Participation	Women have equal participation in decision- making.
Conscientization	Women believe that gender roles can be changed and gender equality ispossible.
Access	Women gain equal access to resources and its benefits on an equal basis.
Welfare	Women's needs are met.



Studies on empowerment of women through ICTs further state various determinants of women empowerment. Demographic status, economic status, social status and media exposure are the major determinants of women empowerment that lead to increase in self esteem, more control over resources, decision making capacity and mobility of women in community (Mahmud *et al.*, 2012).

Even after ICTs being available at the first place, gender discrimination in utilization and access to ICTs is evident from the past literature. Access and utilization can enable women and men to gain a stronger voice both at community and national level. The access to the internet and other forms of ICTs, like mobile phones, PCs, coloured TV, varies, however, from men to women and between urban and rural communities. In Indian context this revolution of ICTs has not been passed on to the womenfolk primarily due to the social structure, values and beliefs. Hafkin and Huyer (2007) in a study on gender divide stated that the proportion of female internet users is below 50 percent. In underdeveloped countries like Yemen, Nepal, and India, overall penetration rates are low and gender gaps are very high. Women internet users in India are less than 25 percent. Danjuma *et al.* (2014) in a study on opinion of how less women study and use information technology than men revealed that about 7.5 percent of respondents strongly disagreed to the question, 21.5 percent of the respondents disagreed that less women study and use ICT, 3.75 percent of the respondents remained neutral to the question, while majority of the respondents i.e. 40 percent agreed that less women study and use ICT, and 27.5 percent strongly agreed with the fact that fewer women study and use ICT. There are many reasons that affect women access to technology. Huyer & Tatiana (2003) highlighted that social and cultural factors limit women's access to shared ICT facilities such as cybercafés, or tele centers, which often become meeting places for young men, and hence resist women's absorption and adoption of ICTs to access desired information and knowledge. Mackey & Petrucka (2021) stated that major connectivity obstacles for women relate to place of access (particularly safety and security of location), time constraints, technophobia and technological literacy like using internet, apps, online transactions, and other online services etc. Study also quoted that "in India 51 percent of women can read and write compared to 75 percent of men and without this fundamental skill, the Internet and the benefits of the online world will remain out of reach for women." Henceforth it is transparent that in developing country like India the potential of ICTs is still unexplored due to unequal access, utilization, availability, low level of technical literacy and other socio-economic factors. Despite this vast potential,

present status of women empowerment through ICT is not very much satisfying in both rural and urban settings.

SUGGESTED STRATEGIES

The prerequisite to empower women in India is the need for such an educational system which should compose of relevance and quality, equality in access to resources, career opportunities and adequate financial support from government (Margrate,2021)

- The understanding of access, use, and barriers regarding ICTs would be useful in devising strategies and policies for the stakeholders that incrementally improve the situation of women.
- In order to ensure that entire population reap the many benefits of ICTs, a clear understanding of women's attitude, constraints in accessing and utilization of technology is crucial.
- Improving the educational facilities for girl child so that they get opportunities to excel from the start of their lives.
- Ensuring that women in developing countries understand the significance of technologies and use them.

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IMPACT OF CLUSTER FRONT LINE DEMONSTRATIONS ON YIELD AND ECONOMICS OF RICE FALLOW GREENGRAM (*VIGNA RADIATA L*) IN N.C ZONE OF A.P.

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ABSTRACT

Green gram (*Vigna radiata* L.) being a short duration nutritive legume crop, best suited for intensive cropping system in India. In North Coastal Zone of Andhra Pradesh rice-greengram is profitable cropping system but the productivity of greengram is very low due to various reasons. Front line demonstrations on greengram in cluster mode were conducted in Medicharla and Gajapathinagaram villages of Visakhapatnam district, Andhra Pradesh during *rabi*2019-20 and 2020-21crop season in order to increase the adoption of best management practices and there by the productivity of greengram. The demonstrated technology is ICM (Integrated Crop Management) practices viz., high yielding variety (IPM 2-14), seed treatment byimidachloprid @ 5 ml per Kg seed, soil application of PSB @ 2 Kg per acre, post emergence application of weedicide quiizalofop ethyl @ 400 ml per acre at 25 DAS, application of neem oil at 10 DAS, foliar application of multi K at flowering, erecting of sticky traps (yellow and blue)for controlling the sucking pests, water management at critical stagesand timely plant protection measures against pests and diseases. The demonstration plot recorded higher yield of 580 kg/ha during 2019-20 and 584 Kg/ha during 2020-21 as compared to the farmers practice i.e 400 Kg/ha during 2019-20 and 393 Kg/ha during 2020-21.ICM practices in new high yielding variety (IPM 2-14) increased the greengram yield to the extent of 45.0% and 48.7 % than the local practice during 2019-20 and 2020-21 respectively. Mean gross returns and net returns of demo plot are 35,380/- and 26,780/- Rs ha-1. Whereas, in check plot, gross returns is 24,050/- Rs ha-1 and mean net returns is 17,290/- Rs ha-1. Mean C: B ratio of demo plot is 1:3.11 whereas check plot mean C: B ratio is 1:2.54. Higher net returns and C: B ration in demo plot is due to higher grain yield. CFLDs on ICM in greengram clearly indicated that by adoption of recommended ICM practices, productivity of greengram under rice fallow situation can be increased and farmers can realize higher net profit .

Key words: Frontline demonstration, Greengram, Variety-IPM 2-14

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INTRODUCTION

At present world is facing tough challenge to provide balanced diet to every one for ensuing food security. Pulses are food legumes next to cereals and are the best option for sustainable agriculture. India has 35% of global area and production of pulses and is larger producer and consumer of pulses (Pulses in India, 2018).The major pulses producing states are Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Andhra Pradesh and Karnataka. These six states account for 79 percent of area and 80 percent of production of pulses in India. Green gram (*Vigna radiata* L.) is one of the most important pulse crop grown in India. It is a good source of quality protein and minerals when compared to other pulse crops (Katari*a et al*., 1989).Being a short duration (60 -70 days) crop it plays important role in the intensive cropping system of tropical and temperate regions. Greengram is tolerant to drought and come up well in various soil types under different climatic conditions (Malik *et al.,* 2006).Weinberger, 2003 observed that greengram crop in a rice rotation system has increased the paddy yield and there by income. Rice fallow pulse system is viable, sustainable and remunerative cropping system in N.C zone of A.P.

National Development Council (NDC) during Eleventh Five Year Plan adopted a resolution to enhance the production of rice, wheat and pulses by 10, 8 and 2 million tons respectively by 2011 with an outlay of Rs. 4,882 crore under National Policy for Farmers. This is operationalized through Centrally Sponsored Scheme 'National Food Security Mission (Anonymous, 2011). The concept of Cluster Front Line Demonstrations (CFLDs) put forth under this mission with a farmer centric approach. These demonstrations are directly conducted by the scientists of Krishi Vigyan Kendras andSAUs. Krishi Vigyan Kendra Kondempudi is newly established at Kondempudi village, Buchayyapeta mandal during 2017 and since then working for farmers especially for rainfed and tribal farmers of Visakhapatnam district. With an objective to enhance productivity level of rice fallow greengram through large scale adoption of ICM technologies, these on farm demonstrations were conducted in cluster mode.

MATERIALS AND METHODS

The study was carried out by the Krishi Vigyan Kendra, Kondempudi, Visakhapatnam district of Andhra Pradesh during *rabi* season under rice fallow situation in the farmers field on two clusters (each cluster 10 ha) during 2019-20 and 2020-21. These demonstrations were conducted each 25 locations in Medicharla village of K.Kotapaadu mandal during 2019-20 and Gajapathinagaram village of Devarapalle mandal during 2020-21.The soil of the demonstration plots are light to medium textured sandy loam and pH values ranged between 7.1 to 7.9.The demonstrated technology is improved variety (IPM 2-14), seed treatment byimidachloprid (Goucho) @ 5 ml per Kg seed, soil application of PSB @ 2 Kg per acre, post emergence application of weedicide quizalofop ethyl @ 400 ml per acre at 25 DAS, application of neem oil at 10 DAS, foliar application of multi K at flowering, water management at critical stages water management at critical stages, erecting stick traps (yellow and blue) against sucking pests and timely plant protection measures. Farmers practice plot was kept as check plot at every demonstrative plot. The

Table 1: Recommended practices and farmer's practices in rice fallow greengram

Component	Technology demonstrated	Farmers Practice
Variety	IPM 2-14	Local variety
Seed Treatment	Done with Imidachloprid @ 5 ml per Kg seed	Seed treatment not done
Method of sowing	Broadcasting the treated seed 2-3 days before harvesting of paddy (Rice fallow pulse system) uniformly.	Broadcasting the untreated seed 2-3 days before harvesting of paddy (Rice fallow pulse system)
Weedicide application	Post emergence application of Imazitafir @ 400 ml/acre	Not Applied
Soil application	Application of 2 Kg PSB mixed in 50 Kg FYM in field	Not Applied
Foliar application of fertilizers	Foliar application of multi k @ 5 g/lt of water at flowering stage	No foliar application
Plant protection measures	Neem oil spray at 10 DAS, erected yellow and blue sticky traps for sucking pests and installed pheromone traps against	Sprayed insecticides against sucking pest, leaf folder, maruka pod borer and YMV

technologies demonstrated in the demo plot and the existing farmers practice are given here under (Table 1).

Scientists of Krishi Vigyan Kendra, Kondempudi conducted pre seasonal training before organising the demonstrations to the selected farmers on ICM practices like seed treatment, sowing, weed and nutrient management and pest management aspects. Site Selection and farmers' selection were done as indicated by Choudhary, (1999).The data pertaining to yield were collected randomly by cop cutting method from both the demonstrated technology and farmers practice and analysis was done using simple statistical tools. Other parameters like harvest index (%), increasing in yield (%), technology gap (%), extension gap(%) and technology index were worked out as suggested by Kadian *et al.* (1997). The economics of the both demo plot and farmers practice are calculated in terms of gross return, net return, cost ofcultivation and benefit cost ratio. Using the collected data both from demonstration plot as well as farmers practice, extension gap, technology gap, technology index and also benefit cost ratio were workedout (Samui *et al.,* 2000) as per the formulas given below.

(i) Harvest index (%) = $\frac{\text{Grain Yield}}{\text{Biological yield}} \times 100$

(ii) Increasing yield (%)= Yield from demonstration plot –Yield from farmers practice X100

Yield from farmers practice

(iii) Technology gap = Potential Yield of the crop variety - Demonstration yield

(iv) Extension gap = Yield obtained from demonstration plot -Yield from farmers practice

(v) Technology index = Potential Yield of the crop variety - Demonstration plot yield X 100

Potential Yield of the crop variety

(vi) Cost Benefit Ratio =

Gross returns (Rs.ha^{-1})

Cost of cultivation (Rs.ha^{-1})

RESULTS AND DISCUSSION

The results obtained from the present study are presented in the table- 2,3 & 4.

Growth and Yield parameters and yield

The tallest plants were recorded in farmers practice (check) plot with local variety but yield parameters like pod length, number of seeds per pod and 100 seed weight are higher in demonstration plots during the both the years. (Table 2). The data indicated that the ICM practices including new greengram variety IPM 2-14 gave higher yield of 580 kg/ha during 2019-20 and 584 Kg/ha during 2020-21 as compared to the farmers practice i.e 400 Kg/ha during 2019-20 and 393 Kg/ha during 2020-21.The results of the demonstrations clearly indicating that use of ICM technologies in rice fallow greengram enhanced the grain yield to the extent of 45.0% and 48.7 % than the local practice during 2019-20 and 2020-21 respectively. Poonia and Pithia(2011), Patel *et al.,* (2013) and Raj *et al.* (2013) were also observed the similar findings.

TECHNOLOGY GAP

The technology gap is the difference between demonstration yield over the potential yield of that particular crop variety which is calculated and presented in Table 3. The technology gap was ranged from420 kg/ha in 2019-20 to 416 kg/ha in 2020-21 and average technological gap during the period of study is 418 kg/ha. The technology gap is due to variation in soil fertility status and climatic conditions (Mitra and Samajdar, 2010).

EXTENSION GAP

The yield gap between demonstration plot and check plot is extension gap. During 2019-20 the extension gap is 180 Kg/ha while during 2020-21 it is 191 Kg/ha. The average extension gap during the period of study was 185.5 kg/ha. This technology gap indicating the need of the transfer of technology by various means. Large scale adoption of simple ICM practices along with high yielding variety will change the extension gap. Similar observations were also recorded by Hiremath and Nagaraju (2010).

TECHNOLOGY INDEX

The technology index was ranged from 42.0% during 2019-20 to 41.6 % during 2020-21 and average technology index during the period of study is 41.8 % (Table 3). The technology index indicates the feasibility of the technology at the farmer's field. The lower value of the technology index indicates more feasibility of the technology. Similar observations were also made by Mokidue *et al.* (2011).

ECONOMICS

Perusal of the data on economics presented in the Table-4 revealed that gross returns, net returns and C: B ratio were substantially higher in demonstration plot as compared to the farmers practice (Check plot) during both the years. Mean gross returns and net returns of demonstration plot are Rs.35,380/- per ha and Rs.26,780/-per ha. Whereas, in check plot, mean gross returns is Rs.24,050/-

Table 2:Performance of rice fallow greengram during 2019-20 and 2020-21

Treatment	Mean Plant Height at harvest (cm)		No of pods plant -1		Pod length (cm)		No of seeds /pod		100 seed wt. (gm)		Seed Yield kg.(q ha^{-1})		Stover's yield (q ha-1)	
	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21
Demo Plot	47.1	48.2	10	11	5.9	6.0	9.0	9.5	3.5	3.6	580	584	1950	2080
Farmers practice	52.3	53.0	9	9	5.6	5.7	8.0	8.0	3.1	3.0	400	393	1680	1600

Table 3.Seed yield, harvest index, technology gap, Extension gap and technology index of rice fallow greengram during 2019-20 and 2020-21

Year	Area (ha)	No.of Demos	Grain yield kg.(q ha^{-1})			% Increase over FP	Straw yield kg.(q ha^{-1})		Harvest Index (%)		Technology Gap kg.(q ha^{-1})	Extension gap kg.(q ha^{-1})	Technology Index
			Potential yield	Demo	Check		Demo	Check	Demo	Check	Demo	Demo	Demo
2019-20	10	25	1000	580	400	45.0	1950	1680	22.9	19.2	420	180	42.0
2020-21	10	25	1000	584	393	48.7	2080	1600	21.9	19.7	416	191	41.6
Mean			1000	582	396.5	46.8	2015	1640	22.4	19.5	418	185.5	41.8

Table4. Economics of the cluster FLD on greengram during 2019-20 and 2020-21

Year	No. of Demos	Area (ha)	Economics of the demonstration/ha				Economics of the check/ha			
			Gross cost	Gross return	Net return	CBR	Gross cost	Gross return	Net return	CBR
2019-20	25	10	8600/-	34,800/-	26,200/-	1:3.04	6800	24000	17,200	1:2.52
2020-21	25	10	8600/-	35960/-	27,360	1:3.18	6800	24,180	17380	1:2.56
Mean			8600/-	35380/-	26780/-	1:3.11	6800/-	24050/-	17290/-	1:2.54

per ha and mean net returns is Rs.17,290/-per ha. Mean C: B ratio of demonstration plot is 1:3.11where as check plot mean C: B ratio is 1:2.54. Higher seed yield in demonstration plot contributed to higher net returns and C: B ratio.

OUTPUT

Average seed yield was 5.82 q/ha (48.7% higher than FP or check plot)

Gross returns are 47.1% high over FP or check plot

Net returns were 55% high over FP or check plot

Favourable benefit: cost ratio of 3.11 (Demo) over 2.54 (Check)

CONCLUSION

The result of cluster front line demonstrations on production technology of rice fallow greengram clearly indicated that by adoption of recommended ICM practices with high yielding new variety , the farmers can realize higher seed yield and net returns. There is a need of popularising these technologies among the farmers by using various extension methodologies.

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IDENTIFICATION OF POTENTIAL DISTRICTS FOR GROUNDNUT IN TELANGANA STATE

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ABSTRACT

Groundnut has been cultivated all over the world and important source of edible oil. The study was conducted to identify the potential districts of groundnut in Telangana. The information is collected to study the area(2016 - 2019) , yield of groundnut for four years (2016 - 2019). The potential districts for groundnut are identified using the relative yield index, relative spread index. The study was conducted in thirty three districts of Telangana region out of which five districts are found has potential groundnut districts.

INTRODUCTION

Groundnut scientifically known as *Arachis hypogea*, belongs to family Fabaceae or Leguminosae. Groundnut kernel contains 45 to 55% of oil. India is the second largest producer of groundnut in the world. It is the importance source of edible oil in the country. The cultivation of groundnut in Telangana is 1.67 Lakh ha area with the yield of 2230 kg ha-1 (2017-19). Even though the groundnut has been cultivated across the country but production is less due to low yield .The yield is usually assessed based on suitability of agronomic conditions to crops in a specified area .For increasing the production, productivity, the groundnut has to be grown in the districts which are usually having conditions suitable for getting high yield compared to other districts in the state.

MATERIAL AND METHODOS

The information on area, yield of groundnut of all the districts in Telangana state are gathered from(DES) Directorate of Economics and Statistics .From this four year (2015-16 to 2019-20) data, relative spread index (RSI) and(2016-17 to 2019- 2020) relative yield index (RYI).

$$RSI = \frac{\text{Area of the particular crop expressed as \% of total cultivable area in the district}}{\text{Area of that crop expressed as \% to the total cultivable area in the country}} \times 100$$

$$RYI = \frac{\text{Mean yield of a particular crop in a district}}{\text{Mean yield of that particular crop in the country}} \times 100$$

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Based on the RSI, RYI the districts which are potential for groundnut crop were identified

RESULTS AND DISCUSSION

Relative spread index (RSI)

The information on maximum area for groundnut among all districts is indicated by using RSI.The RSI was maximum Nagar Kurnool, Mahabubnagar, Wanaparthy, Gadwal.The values of high RSI shows the main groundnut growing areas. The reasons for high groundnut growing areas is due to suitability of soil, proper irrigation, climate suitability and management practices etc.

The low RSI value districts area asifabad, Peddapalli, Sangareddy, Kamareddy,Macherial which shows that lower spread of groundnut. The

Districts	RSI	RYI
Adilabad	179	104
Bhadradri	356	113
Jagitial	182	73
Jangoan	472	74
Jayashankar	114	96
Jogulamba	3817	107
Kamareddy	30	104
Karimnagar	395	95
Khammam	350	85
Asifabad	7	102
Mahabubabad	1369	72
Mahabubnagar	2173	105
Mancherial	38	104
Medak	28	103
Mulugu	76	79
Nagarkurnool	10333	104
Nalgonda	1168	78
Narayanapet	708	92
Nirmal	71	104
Nizamabad	42	107
Peddapalli	15	103
Rajanna	30	104
Rangareddy	196	104
Sangareddy	20	104
Siddipet	239	91
Suryapet	1278	90
Vikarabad	924	102
Wanaparthy	4885	120
Warangal	1312	148
Warangal Urban	128	103
Yadadri	40	103

reasons for low spread of groundnut may be due to unfavorable climate conditions, poor soil,poor management practices,etc.

Relative yield index (RYI)

The information on districts with high yield for groundnut among all districts is indicated by using relative yield index. The RYI was maximum for Warangal, Wanaparthy, Badadri Kothagudem, Gadwal and Mahabubnagar districts. The reasons for high RYI is due to high yield in that district's. The low RYI value districts are Mahabubabad, Jagthial, Jangoan, Nalgonda and Khammam.

The other districts with both high RSI, RYI are Nagarkurnool, Mahabubnagar, Wanaparthy, Warangal and Gadwal. Nalgonda, Mahabubad districts has high RSI but low RYI values.

The study shows that district with high RSI and RYI were identified has more potential districts for groundnut growing. The factors such as climate, management practices, other factors are responsible for groundnut cultivation in that area. District's with high RSI followed by low RYI values shows that the districts are having maximum area of groundnut and opportunity for increasing the productivity. Development and proper dissemination of appropriate technologies suitable to particular area such that it helps in increasing the yield of groundnut crop.

CONCLUSION

From the above analysis shows that there has to be some strategies to improve the yield of groundnut in potential districts for further increase in the yield through proper dissemination of technology, high yielding varieties suitable to particular area, increasing the adoption, proper management technologies, incentives for farmers for increasing the area under groundnut crop cultivation.

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IMPACT OF UTILISATION OF E-RESOURCES BY THE RESEARCH SCHOLARS OF FACULTY OF AGRICULTURE, ANNAMALAI UNIVERSITY, TAMIL NADU

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ABSTRACT

The growth of internet has emerged as the powerful tool and changed the methods of research, storage, retrieval and communication of scholarly information in higher education system. The use of different e-resources enabled the users to retrieve relevant information. The growing importance of e-resources in education and research, agricultural educational institutes are stepping ahead to keep pace with the latest advances in information technologies. The technological developments are also influencing research scholar's information seeking behaviour and tools and techniques of information seeking. Hence, the present investigation was designed to study the perceived impact of using e-resources, by the research scholars of Faculty of Agriculture, Annamalai University. The present study was conducted in Cuddalore District of Tamil Nadu state. A sample size of 120 research scholars was selected for this study by using proportionate random sampling method. A well-structured and pre-tested questionnaire was used for data collection. Suitable statistical tools were used to analyse the data. The study findings revealed that e-resources had greater impact on effective learning and in publications of journal articles and opined that using e-resources to make presentations in seminars and conferences and improved professional competence.

INTRODUCTION

Advances and trends in electronic storage and transport of information are changing the very nature of libraries. The proliferation of CDROM's and DVDs, the capability to load databases on a number of included library structures (ILS), and the net are making an exquisite wide variety of databases and statistics assets available electronically to a very wide variety of statistics seekers. An organisation may have to spend money on more than one fact layout to be able to offer a well-rounded fact series. The university library is one of the information facilities for all varieties of readers in higher schooling gadgets. The college library draws from the study network and presents its users' desired facts at the proper time. Studies are a primary objective of a college library.

OBJECTIVES OF THE STUDY

The present study has formulated with the following objectives:

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1) To identify and select the various e-resources facilitates agricultural education.

2) To assess the impact of using e-resources among the research scholars in agriculture.

Bhawana *et al.,* (2016) observed that e-resources has made impact on the research by fast communication of research results (42 percent), save the time in literature search (31 percent) and enhanced research publication (21 percent).

Patel and Darbar (2017) opined that majority (88.94 percent) of the respondents agree that they have improved in their academic excellence after using e-resources. About 88.08 per cent agree that their reading skills has been improved, 85.53 percent agree with they have expanded reading possibility,84.68 per cent agree with improved independent and lifelong learning skills, 79.57 percent are agree about their increase in the number of the publications and 71.07 percent agree that their research achievement have increased.

RESEARCH METHODOLOGY

The current research is being carried out at the Faculty of Agriculture, Annamalai University, Cuddalore District. The pattern length consisted of one hundred twenty submitted graduate and doctoral research scholars and was decided on via a proportionate random sampling approach. E-sources are sources wherein statistics are stored electronically and are available through electronic structures and networks. A useful resource is a broad time period that consists of a spread of publishing models, which include OPACs, CD-ROMs, online databases, E-journals, E-books, internet assets, print-on-demand (POD), email publishing, wireless publishing, digital hyperlink and net publishing, etc. The choice of e-assets is based on their availability in the university library, expert opinion, and familiarity with the studies of scholars. The chosen e-resources are: e-Journals, Annual Assessment, Taylor and Francis, Wiley-Blackwell publishing, Springer Hyperlink, economic and political weekly, McGraw-Hill Training, e-books Amazon Kindle, Databases-OPAC, AGRICOLA, Open access to sources-DOAJ, NISCAIS, IAS, web portals-SCOPUS, PROQUEST, web sites-AgNIC, AgREN, Consortium for e-assets in agriculture, e-mag, e-evaluation of records, e-Library, e-Reprint, Offline e-sources: Offline portable PC database (CD/DVD, Pendrive, Hard Disk), and Presentation Software. The perceived effect of the usage of the above e-assets by the research scholars became operationalized as the effectiveness of using e-assets and was measured based totally on the effects, viz., in their mastering, research work, and publications. The responses of the respondents had been collected on a 5-point continuum, namely: strongly agree, agree, agree to a point, disagree, strongly disagree, and implying ratings were laboured out for similarly interpretation.

RESULTS AND DISCUSSION

In the 21st century information Technology (IT) had brought rapid changes in education. The conventional teaching and learning is gradually moving towards online. The concept of Digital library, Virtual library and electronic library came into present situation. For teaching and learning in agriculture electronic resources are available in Web enabled medium. To find out the effectiveness of using various e-resources on

Table Distribution of respondents according to their perceived impact of using e- resources

(n=120)

Sl. No	Impact of Using e-resources	SA		A		ASE		DA		SDA		Mean score
		No	%	No	%	No	%	No	%	No	%	
I	**Learning activities**											
1	Use e-resources to complete my projects, reports and type research articles, course work and assignment	53	44.16	35	29.16	32	26.68	0	0.00	0	0.00	4.17
2	e-resources allows me to learn effectively	77	64.16	43	35.84	0	0.00	0	0.00	0	0.00	4.64
3	use e-resources to make presentations in seminars and conferences	70	58.33	33	27.50	0	0.00	10	8.34	7	5.83	4.24
	Grand mean											4.35
II	**Research work**											
1	Expedited the research process	39	32.50	25	20.83	45	37.50	0	0.00	11	9.17	3.67
2	Submitting research proposal	20	16.67	25	20.83	42	35.00	28	23.34	5	4.16	3.22
3	Improved professional competence	68	56.67	20	16.67	12	10.00	15	12.50	5	4.16	4.09
4	Dependency on e-resources has increased	0	0.00	30	25.00	44	36.66	30	25.00	16	13.34	2.73
	Grand mean											3.42
III	**Publications**											
1	Journal articles	77	64.16	33	27.50	10	8.34	0	0.00	0	0.00	4.55
2	Research report	19	15.83	24	20.00	20	16.67	11	9.16	46	38.34	2.65
3	Chapters in book	0	0.00	30	25.00	40	33.34	14	11.66	36	30.00	2.53
	Grand mean											3.65

the academic activities of research scholars and to know the extent to which the e-resources had influence on their learning, research and publications data are collected and presented in the Table .

The results on Table 6 shows the perceived opinion of research scholars on the impact of using e-resources revealed that majority (64.16 per cent) of the research scholars strongly agreed that e-resources allows me to learn effectively and in publications of Journal Articles, followed by (58.33 per cent) of the respondents stated Use e-resources to make presentations in seminars and conferences,

(56.67 per cent) Improved professional competence.

"Use e-resources to complete my projects, reports and type research articles, course work and assignment" (44.16 per cent), "Expedited the research process" (32.50 per cent) and only a few 16.67 per cent, 15.83 per cent stated that "Submitting research proposal" and "Research report" respectively.

CONCLUSION

Hence it could be concluded that the perceived opinion of research scholars on the impact of using e-resources in their academic activities revealed that majority (64.16 per cent) of the research scholars opined that e-resources allows me to learn effectively and publication of journal articles, followed by (58.33 per cent) of the respondents stated use e-resources to make presentations in seminars and conferences and improved professional competence (56.67 per cent).

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A STUDY ON ACCESS OF INFORMATION, EDUCATIONAL AND HEALTH FACILITIES TO AGRICULTURAL LABOURERS

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ABSTRACT

The present study was conducted in Andhra Pradesh state during the year 2018-20 with an objectiveto study theaccess of information,educational,health facilities to the agricultural labourers. An *Ex-post facto* research design followed for the study. Three districts from the three regions of Andhra Pradesh, Srikakulam from North Coastal, Guntur from South Coastal and Kurnool from Rayalaseema region were purposively selected based onthe highest number of agricultural labourers and a total of 240 agricultural labourers were selected for study.The results identified that majority (22.09%) of the agricultural labourers accessed information for agriculture from neighbours, Similarly, (50.00%) employment/labour related informationaccessed from group head, (30.00%) of them were information accessed from television information accessed on climatic and environmental hazards, (18.75%) of them were accessed information on skill upgradation from panchyat/society officials, (20.00%) were accessed information forcapacity building from Neighbours and 15.00 per cent of them were accessed information for empowerment from television.cent per cent agricultural labourers had accessed government educational Institutes within the village and that (71.66%) respondents had existed hostel facilities.

Key Words:information, access, Ex-post facto,three regions, information channel

INTRODUCTION

Agriculture is the primary source of livelihood for about 58.00 per cent of India's population. The Gross Value Added by agriculture, fishing and forestry was estimated at Rs. 19.48 lakh crores. Growth in terms of Gross Value-Added Product in agriculture and allied sectors stood at 4 percent in 2020, and was estimated to be 3.00 percent in the second quarter of Five Year 2021. With 1.3 billion people employed in the sector, agriculture is the second greatest source of employment worldwide after services and it accounts 28.00 percent of global employment. While more than two-third of the population in poor countries work in agriculture, less than 5.00 percent of the population does in rich countries. It is predominantly the huge productivity increase that makes this reduction in labor possible. Agriculture is the most important sector of female employment in many

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countries, especially in Africa and Asia. At the global level, women do share of 38.00 percent, while men about 33.00 percent.

Female employment in agriculture in India was 56.50 per cent in 2019. Value over the past 28 years was 76.28 percent in 1991, while its lowest value was 56.50 percent in 2019, Similarly male employment in India was 39.53 percent in 2019. It was highest i.e., 58.16 percent in 1991, while, it was lowest i.e., 39.53 percent in 2019. Employment in agriculture in India was 43.21 percent in 2019 and was 63.05 percent in 1991 which was highest in last 28 years. From the year ending June, 2005 to the year ending June, 2018, the rural male population employed in agriculture seen a decline of 12 percent (from 67.00 percent to 55.00 per cent); while the rural male population witnessed a spike in the manufacturing sector by 8 percent (from 15 per cent to 23.00 percent). In the tertiary sector as well, rural male employment has increased by 4 per cent from 18.00 percent to 22.00 per cent (International Labour Organization, 2019).

Presently, the agriculture sector employs 80.00 percent of all economically active women in India, which includes 48.00 percent of the self-employed farmers and 33.00 percent of the agriculture labour force. Over the years, rural households' dependency on agriculture has declined to 50.00 percent as per the latest round of the Periodic Labour Force Survey for 2018-19. In addition, the agriculture sector's contribution to National Gross Domestic Product has declined from 34 percent in 1983-84 to 16 per cent in 2018-19. Similarly, agriculture sector's contribution to Gross State Domestic Product has broadly followed the same pattern over the same period (The Economic Times, 2021).

As per 2011 census, highest number of agricultural labourers were found in Srikakulam from North Coastal Region, 4,42,295 male and female agricultural labourers, Guntur district from South Costal Region which comprises 1,035,569 male and female agricultural labourers and Kurnool district from Rayalaseema Region consists 8,69,074 male and female agricultural labourers so, these three districts selected from three regions of the state (www.censusindia.co.India).

Livelihood is always more than just a matter of making shelter, transacting money and preparing food to put on the exchange in the market place. It is equally a matter of the ownership and exchange of information, the management of social relationships, the affirmation of personal meaning and group identity and the inter relationship of each of these tasks to the other. All these productive tasks together constitute a livelihood.

India is a country which majority of people depend on agriculture directly and indirectly as a source of income. Agriculture sector is primarily influenced by farmers, agricultural labourers, and traders. In India, 50.00 percent of work force employed as agriculture labourers are huge in number. Agricultural labourers were deciding factor of cost of production and adopting, practicing of technologies and playing crucial role in yield improvement. Agriculture labourer's livelihood plays crucial role in socio economic development of agriculture. The type of livelihood-practice influences the ecosystem. So, analysis of the agricultural labourers livelihood is critical important phenomena. Many such studies related to the agriculture labourers were conducted, but there are limited studies related

to livelihood analysis of agriculture labourers. Hence the present piece of investigation has been undertaken as one among such studies, focusing on the state of Andhra Pradesh, with the given objective.

MATERIAL AND METHODS

In the study, *Ex-post facto* research design was followed. An *Ex-post-facto* research design is a systematic empirical inquiry in which the scientist does not have any direct control of independent variables because their manifestations have already occurred or because they inherently cannot be manipulated (Kerlinger, 1983).The study was conducted in three districts (Srikakulam, Guntur and Kurnool) of Andhra Pradesh selected based on the highest number of agricultural labourers in three regions namely North Coastal, South Coastal and Rayalaseema Regions. Two mandals were selected from each district by using simple random sampling procedure. Again, four villages were selected from each of the mandal by using simple random sampling procedure, thus making a total of 24 villages. From each of the selected village, ten respondents will be selected by using simple random sampling procedure, thus coming to total of 240 respondents.

For measurement of access of information on six related areas selected for the study and elven locally accessed information sources chosen for the study. For measurement of education within, nearby village, within the town corporate and government education, hostel facilities selected for the study.

In case of health services access and affordability of health services were selected for the study.

RESULTS AND DISSCUSSION

1. Agriculture

From the Table 1 it could be concluded that majority (22.09%) of agricultural labourers accessed information for agriculture from neighbours followed by those (20.00%) accessed from group head, (15.83%) from panchyat/ society officials, (10.42%) from newspapers, (3.33%) from internet, (3.76%) from others, (5.83%) from television, (2.92%) from mobile/mobile applications and 1.66 per cent from radio and extension personal.This finding was new.

2. Employment / Labour

From the Table 1 it is revealed that Half (50.00%) of the agricultural labourers accessed information for employment or labour work from group head followed by those (28.75%) from neighbours, (7.09%) from panchyat/ society officials, (4.58%) from local leaders, (3.34%) from others, (2.50%) from newspaper, (1.25%) from television and extension personal, (0.83%) from internet, (0.41%) from mobile/mobile application and none of them accessed information from radio.This finding was new.

3. Climatic Hazards

From the Table 1 it could be concluded that majority (30.00%) of the agricultural labourers accessed information for climatic hazards from television, (28.36%) from newspaper, (22.91%) from mobile/mobile application, (5.41%) from neighbours and radio, (2.91%) from group head, (1.68%) from extension personal, (1.25%) from internet and others, (0.41% each) from panchyat/society officials and local leaders. This finding was new.

Results And Discussion

Table:-1 Different information access sources of agricultural labourers

S. No.	Information Access	Neighbours	Local Leaders	Panchyat/ Society Officials	Group Head	News Paper	Radio	Television	Mobile/Mobile application	Extension personal	Internet	Others	Total
1.	Agriculture	53	30	38	48	25	4	14	7	4	8	9	240
		(22.09%)	(12.50 %)	(15.83%)	(20.00 %)	(10.42 %)	(1.66%)	(5.83%)	(2.92%)	(1.66%)	(3.33%)	(3.76%)	(100%)
2.	Employment/ Labour	69	11	17	120	6	0	3	1	3	2	8	240
		(28.75%)	(4.58%)	(7.09 %)	(50.00 %)	(2.50%)	(0.00%)	(1.25%)	(0.41%)	(1.25%)	(0.83%)	(3.34%)	(100%)
3.	Climatic Hazards	13 (5.41%)	1 (0.41%)	1 (0.41 %)	7 (2.91 %)	68 (28.36 %)	13 (5.41%)	72 (30.00 %)	55 (22.91%)	4 (1.68%)	3 (1.25%)	3 (1.25%)	240 (100%)
4.	Skill Up gradation	31	16	45	38	30	6	15	18	10	15	16	240
		(12.91%)	(6.66%)	(18.75%)	(15.83 %)	(12.50 %)	(2.50%)	(6.25%)	(7.50%)	(4.16%)	(6.25%)	(6.66%)	(100%)
5.	Capacity Building	48	14	35	31	23	10	5	13	12	25	24	240
		(20.00%)	(5.83%)	(14.58%)	(12.91 %)	(9.58%)	(4.16%)	(2.08%)	(5.41%)	(5.00%)	(10.41%)	(10.00%)	(100%)
6.	Empowerment	26 (10.83%)	9 (3.75%)	15 (6.25 %)	17 (7 .09%)	16 (6.66%)	19 (7.91%)	36 (15.00 %)	25 (10.41%)	32 (13.33%)	26 (10.83%)	19 (7.91%)	240 (100%)

Table:-2 Distribution of agricultural labourers according to their access to educational facilities

Facility	Location	Nature of Institute/School	Frequency	Percentage
Educational Institutions	Within Village	Private	0	0.00
		Government	240	100.00
	Nearby Villages	Private	67	27.91
		Government	173	72.00
	Nearby Town	Private	233	97.09
		Government	171	71.25
		Corporate	90	37.50

Table: -3 Distribution of agricultural labourers according to their access to hostel facilities

Hostel facilities	Existing	172	71.66
	Non-Existing	68	28.34
	Total:	**240**	**100.00**

Table:-4 Distribution of agricultural labourers according to their access andAffordability Health Service

1. Access to Health Service			
A.	**Existence of Health Centres**	**Frequency**	**Percentage**
I.	Within Village	102	42.50
II.	Nearby Village	70	29.16
III.	Nearby Town	68	28.34
	Total:	**240**	**100.00**
B.	**Affordability of Health Services**	**Frequency**	**Percentage**
I.	Without Fee	40	16.66
II.	Normal Fee	30	12.50
III.	At AffordableCost	67	27.92
IV.	At high Cost	103	42.92
	Total:	**240**	**100.00**

4. SKILL UP GRADATION

From the Table 1 it could be concluded that Majority (18.75%) of the agricultural labourers accessed information for skill up gradation from panchyat/society officials followed by those accessed (15.83%) from group head, (12.91%) from Neighbours, (12.50%) from newspaper, (7.50%) from mobile/mobile application, (6.66%) from local leaders and others, (6.25%) television and internet, (4.16%) from extension personal and (2.50%) from radio.This finding was new.

5. Capacity Building

From the Table 1 it could be concluded that majority (20.00%) of the agricultural labourers information accessed for capacity building from radio followed by those (14.58%) from panchyat/society officials, (12.91%) from group head, (10.41%) from internet, (10.00%) from others, (9.58%) from newspaper, (5.83%) from local leaders, (5.41%) from mobile/mobile application, (5.00%) from extension personal, (4.16%) from radio and 2.08 from television**.**This finding was new.

6. Empowerment

From the Table 1 it could be concluded that majority (15.00%) of agricultural labourers accessed of information for empowerment from television, (13.33%) from extension personal, (10.83%) from neighbours and internet, (10.41%) from mobile/mobile application, (7.91%) from newspaper and others, (7.09%) from group head, (6.25%) from panchyat/ society officials, (6.66%) from newspaper and (3.75%) from local leader.This finding was new.

RESULTS AND DISCUSSION

From the Table 2 it could be concluded that cent per cent agricultural labourers had accessed governmenteducational Institutes within the village followed by there is no private educational institutions exists within the village.This finding was new.

From the Table 2 it could be concluded that (72.00%) agricultural labourers had accessed government institutes nearby villages followed bythose (27.91%)of responds had private institutes.This finding was new.

From the Table 2 it could be concluded that (97.09%)had agricultural labourers had accessed private institutes had nearby town followed bythose (71.25%) government educational institutes and 37.50 % had corporate educational institutions nearby town. This finding was new.

From the Table 3 it could be concluded that (71.66%) respondents had existed hostel facilities and (28.34%) respondents had no hostel facilities.This finding was new.

From the Table 4 it could be concluded that majority (42.50%) of agricultural labourers' existence of health services with in the village followed by 29.16 per cent accessed nearby town and 28.34 per cent nearby town.This finding was new.

From the Table 4 it could be concluded that majority (42.92%) of agricultural labourers were affordability of health services at high cost followed by (27.92%)at affordable cost, (16.666%) without fee and (12.50%)at normal fee.This finding was new.

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PERCEPTION OF MEMBERS OF FARMER PRODUCER GROUPS ON TRIBAL DEVELOPMENT PROGRAMMES

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ABSTRACT

Development programmes and schemes improved the standard of living of tribal farmers by being more goal focused and reacting to their perceived needs. The perception of members on tribal development programmes in relation to FPGs might have a noticeable influence on their participation in group activities. The present study was conducted with a focus on farmers perception on tribal developmental programmes. Srikakulam district of Andhra Pradesh with highest rural population to scheduled tribe population (96.58 %) was purposively chosen for the study. Seethampeta block of Srikakulam district with highest number of FPGs and members was selected. A sample of 145 respondents was taken using multistage proportionate random sampling method. Data collection was done with the help of pre-tested well-structured interview schedule. The respondents were asked to rate on a three point scale for the indicators of perception on tribal development programmes. The collected data was analysed using mean and standard deviation. The findings of study implicated that majority (82.76 %) of the members of tribal FPGs showed a medium level of overall perception. Perception of tribals on development programmes to fulfil their basic necessities was found to be most functioning by nearly three-fourths (71.72 %) of respondents. Perception on target orientedness was found to be mostly target oriented by more than two-thirds (68.96 %) and livelihood was found to be mostly enhanced by 54.48 per cent of respondents. Procedures and formalities in accessing the development programmes were perceived to be moderately difficult by two-thirds (66.90 %) of respondents and interaction behaviour among tribes was perceived to be moderately improved by 53.10 per cent of respondents. The results could be justified that the functioning of FPGs towards the target, access to development programmes, enhancement of livelihood and interaction behaviour were perceived to be of medium level by the members of FPGs.

Key words: Developmentprogrammes; Farmer Producer Groups (FPGs); Perception; Tribal farmers

INTRODUCTION

Agriculture can be understood as an endeavor to create an artificial ecosystem with the purpose of providing sustenance for humans (Nasution, 2008). The programme structure directed the purposes and outcomes for sustainable mechanisms of living with regard to biodiversity conservation when establishing agricultural livelihood strategies (Frankenberger *et al*., 2002). Agriculture is critical to the Indian

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economy. Agricultural and allied industry services employ around 54.6 percent of the total workforce (Census, 2011). India features the world's largest tribal population. According to the 2011 census, the country's tribal population is 10.43 crore, accounting for 8.60 per cent of the total tribal population.

The main issues that tribal farmers faced were difficulties in obtaining financing, inability to employ farm machinery for convenience of work due to limited landholdings, and a lack of awareness about market linkages and market information. These factors contribute to tribal farmers' low output and income. Given the need to assist small and marginal farmers, the Indian government created a grassroot entrepreneurial development mechanism known as Producers Organizations (PO) to provide access to enough credit, apply technological developments, maximize input efficiency, and create marketplaces(Hellin etal., 2009).Farmer groups serve as an effective route for disseminating technology to a multitude of small and marginal farmers, as well as providing feedback to the officials of the extension system (Karthik et al., 2016).

Farmers' producer associations and producer firms were extremely advantageous in improving the value chain of agricultural output and, as a result, in obtaining fair prices for their output (Sawairam, 2014).The commitment of the members is critical to the success of these farmer producer associations. The most essential conditions for the successful expansion of such firms are integrity and excellent leadership, as well as a proper market environment. (Kathiravan*et al*.,2017). Habtemariam et al., (2015) stated that Rural farmers share their knowledge with their neighbours, friends, relatives, and children mostly through casual conversation, exchanging of experiences, and facilitating other farmers to visit their farms.Cultivation costs can be lowered by input sharing, which also results in an increase in profit. Farmers could be empowered by using collectivization (Patil *et al*., 2014).

Since inception to till date, schemes and development programmes has transformed into different shapes during agricultural developmental phases according to the needs and interests of the farming community. Though India and respected state governments involve in this process, there is no significant rise in the standard of living of farmers especially tribals. In this scenario, current study was undertaken to study the perception of members of FPGs on tribal development programmes which can help in improving the policy making process and serve the farming community better.

MATERIALS AND METHODS

The study was carried out during 2020-21 in Srikakulam district of Andhra Pradesh which was purposively chosen as it has highest rural population to scheduled tribe population 96.58 per cent Census, 2011). Among the 38 blocks of the district, Seethampeta block and three villages were selected based on the highest number of FPGs and members. A sample of 145 members of tribal FPGs have been selected using multi-stage proportionate random sampling technique. An ex post facto research design was adopted for the study as the objective was focused on perception of members of FPGs on tribal development programmes. Collection of data was done through well structured and pre-tested interview schedule. The perception of the

members of FPGs on tribal development programmes was measured using three point scale. The collected data was analyzed using frequency, percentage analysis, mean and standard deviation.

RESULTS AND DISCUSSION

Perception is the act of witnessing and interpreting feelings based on previous experiences. The perception of tribals on the development programmes might have a noticeable influence on the membership and active participation in activities of FPGs. The data on perception was gathered, analysed, and categorised in the following tables.

Perception towards fulfilment of basic necessities

Perception of members towards fulfilment of basic necessities through participation in FPG activities shapes their group behaviour. The implementation of tribal development programmes in the direction of fulfilling the basic necessities was studied and shown in Table 01.

The results from Table 01 revealed that FPG members perception on tribal development programmes was found to be most functioning towards fulfilment of basic necessities by nearly three-fourths (71.72 %) of respondents. Moderate functioning towards basic necessities fulfilment was observed among 26.21 per cent and a very few (2.07 %) perceived FPGs to be least functioning.

The members were aware of the development programmes and were perceived to be satisfying the needs of the tribes which might explain the reason for perception towards fulfilment of basic necessities ranged from high to moderate.

Perception towards target orientedness

Orientation of tribal developmental programmes towards target achievement is the basic concept of FPGs. The perception of tribes on target orientedness was studied and results were presented in Table 02.

From Table 02 it could be elucidated that the perception towards target orientedness of tribal development programmes was found to be mostly target oriented by more than two-thirds (68.96 %) of the respondents followed by moderately (28.96 %) and least target oriented (2.07%).

The knowledge of members on developmental activities was good and perceived to be directed towards development of tribes which might contribute to the perception to be most to moderately target oriented.

Table 01. Distribution of the members of FPGs based on their perception of tribal developmental programmes towards fulfilment of basic necessities

(n=145)

S. No.	Fulfilment of basic necessities	No.	Per cent
1.	Most functioning	104	71.72
2.	Moderate functioning	38	26.21
3.	Least functioning	3	2.07

Table 02. Distribution of the members of FPGs based on their perception of tribal developmental programmes towards target orientedness

(n=145)

S. No.	Target orientedness	No.	Per cent
1.	Mostly target oriented	100	68.96
2.	Moderately target oriented	42	28.96
3.	Least target oriented	3	2.07

Perception towards livelihood enhancement

The members of FPGs participate in group activities with an aim of improving their livelihood. The enhancement in livelihood of members of FPGs as perceived by them was analysed and presented in Table 03.

From Table 03, it can be inferred that livelihood was perceived to be mostly enhanced by more than half (54.48 %) of the respondents followed by moderate enhancement (35.86 %) and least enhancement (9.66 %).

The aim of any developmental programme can be achieved only when it uplifts the overall livelihood of the beneficiaries. The findings might be a result of the enhancement in overall life style of the members of FPGs.

Perception towards accessibility

The tribes usually have an opinion that accessing developmental programmes was complex because of the policy specifications, official procedures and execution. The perception of members about the accessibility was analysed and shown in Table 04.

The results from Table 04 showed that two-thirds (66.90 %) of the respondents perceived the tribal development programmes to be moderately difficult followed by very difficult (19.31 %) and very simple (13.79 %).

The poor educational status may be the reason for the perception on accessibility to be moderately difficult.

Perception towards interaction behaviour

Interaction behaviour depicts the social relationship with people of different income levels and improves their knowledge, awareness and participation in group activities.The results on interaction behaviour were depicted in Table 05.

From Table 05 it could be inferred that the perception on interaction behaviour was found to be moderately improved by more than half

Table 03. Distribution of the members of FPGs based on their perception of tribal developmental programmes towards livelihood enhancement

(n=145)

S. No.	Livelihood enhancement	No.	Per cent
1.	Mostly enhanced	79	54.48
2.	Moderately enhanced	52	35.86
3.	Least enhanced	14	9.66

Table 04. Distribution of the members of FPGs based on their perception of tribal developmental programmes towards accessibility

(n=145)

S. No.	Accessibility	No.	Per cent
1.	Very simple	20	13.79
2.	Moderately difficult	97	66.90
3.	Very difficult	28	19.31

(53.10 %) of the respondents. Equal per cent (29.65 %) of respondents perceived interaction to be most improved and least improved.

Overall perception on tribal developmental programmes

The findings on perception of members towards tribal development programmes are shown in Table 6.

From Table 6 it could be inferred that majority (82.76 %) of the members were with medium level of perception on tribal developmental programmes followed by high and low levels with 9.66 and 7.58 per cent respectively.

The results could be justified that the functioning of FPGs towards the target, access to development programmes, enhancement of livelihood and interaction behaviour were perceived to be of medium level by the respondent members of FPGs. The results are in tune with Indumathy (2013) and Kumar *et al.,* (2021).

Table 05. Distribution of the members of FPGs based on their perception of tribal developmental programmes towards interaction behaviour

(n=145)

S. No.	Interaction behaviour	No.	Per cent
1.	Most improved	43	29.65
2.	Moderately improved	77	53.10
3.	Least improved	43	29.65

Table 06 Distribution of the members of tribal FPGs based on their perception on tribal developmental programmes

(n=145)

S. No.	Category	Number	Per cent
1.	Low	11	7.58
2.	Medium	120	82.76
3.	High	14	9.66
Total		**145**	**100.00**
Mean - **11.88**		Standard deviation - **1.25**	

CONCLUSION

The tribals were found usually less socialised and they need to be taken care by providing need based schemes and improve their income and productivity. The supply of inputs and credit to them at right time would improve the efficiency of the development programmes. Awareness should be created on credit facilities, incentives and subsidies for the tribal farmers. This can help the tribes in improving their self-confidence, empowerment and overall development. During creation and conducting crop-based promotional initiatives, policymakers and extension professionals must account for the variances in perceptions of the beneficiaries. It could be suggested that farmers with better perception be chosen as opinion leaders to promote and strengthen development programmes.

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LINKING THE KVKS AND SOCIO-ECONOMIC GROWTH OF TRIBALS WITH TRIBAL SUB PLAN- IN VIEW OF DOUBLING THE FARMERS INCOME

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ABSTRACT

Krish Vigyan Kendras (KVKs) acting as a root level extension centre involved in the timely transfer of location specific, need based technologies and standing forefront to address the challenges in catering the needs of the people belonging to all the sections of the society earning livelihood from agriculture and allied sectors. Since inception of KVKs, they act not only as Knowledge and Resource Hubs but also as One Stop Centres established in almost all the districts of the country and in some big districts two KVKs were operating. All the KVKs established under the ICAR, SAUs, State Governments and NGOs, at the grass root level directly involved with the stakeholder and working without any intermediaries mainly to fill the gaps mainly to strive for the overall development of the farming community through the implementation of State and Central Govt schemes and strategies. Tribal Sub Plan is one such strategy implemented through Krishi Vigyan Kendra's mainly to minimize the gaps in the health, education, food security and to bring the livelihood of tribals to the general communities. As the Krishi Vigyan Kendra's were locally located near to the beneficiaries find out balanced paths i.e., acts as agro advisory centres for timely transfer of weather related and need based technologies, take up initiatives of appropriate asset creation (micro enterprises), demonstrations in the fields of the targeted groups and skill development trainings to the farmers on different sectors like agriculture, horticulture fisheries, animal husbandry, etc., which lead to develop the tribal farmers and join the tribal to the mainstream of development. Krishi Vigyan Kendras established in the ST beneficiary districts of the country implementing the TSP in the DFI villages to the targeted stakeholders in an integrated way specifically more focus was emphasized on skill training programmes, demonstrations, and creation of physical assets/Micro enterprises. By the year 2022, from the activities so far conducted and from the outcome of the KVKs under Tribal Sub Plan, it clearly shows that, TSP will take over the lead portion in doubling the income of the famers and improve the livelihood security of the farmers. KVKs acts as the torch bearers to the future agriculture in India.

Key words: Doubling farmers income, Tribal Sub Plan

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INTRODUCTION

Krish Vigyan Kendras (KVKs) acting as a root level extension centre involved in the timely transfer of location specific, need based technologies and standing forefront to address the challenges in catering the needs of the people belongs to all the sections of the society earning livelihood from agriculture and allied sectors. Since inception of KVKs, they act not only as Knowledge and Resource Hubs but also as One Stop Centres established in almost all the districts of the country and in some big districts two KVKs were operating. All the KVKs established under the ICAR, SAUs, State Governments and NGOs, at the grass root level directly involved with the stakeholder and working without any intermediaries mainly to fill the gaps mainly to strive for the overall development of the farming community through the implementation of State and Central Govt schemes and strategies. Tribal Sub Plan is one such strategy implemented through Krishi Vigyan Kendra's mainly to minimize the gaps in the health, education, food security and to bring the livelihood of tribals to the general communities. As the Krishi Vigyan Kendras were locally located near to the beneficiaries find out balanced paths i.e., acts as agro advisory centres for timely transfer of weather related and need based technologies, take up initiatives of appropriate asset creation (micro enterprises), demonstrations in the fields of the targeted groups and skill development trainings to the farmers on different sectors like agriculture, horticulture fisheries, animal husbandry, etc., which lead to develop the tribal farmers and join the tribal to the mainstream of development.

METHODOLOGY

As per the statistical data of the Komurumbheem Asifabad district Krishi Vigyan Kendra Bellampalli Mancherial conducted socio economic survey of the villages having the highest ST populations for implementation of Tribal Sub Plan. Based on the survey reports, adopted the Tiryani mandal, Pandgidi Madara cluster consist of five Gram Panchayats covering 14 villages having 100 per cent population of Gondu community belongs to ST category. Considering the TSP guidelines, KVK Bellampalli implemented the TSP in the year 2019-20, 2020-21 and continuing in 2021-22. Need assessment, problem identification was conducted through PRA tools and techniques. Action of TSP was chalked out, based on the needs and problems of the tribal farmers. Farmers needed good quality seed for good yields and returns. Keeping in view of the doubling the farmers income and inconsideration to the needs, Farmers were provided with good quality, high yielding seeds from SAU, ICAR institution to replace with locally available poor quality, low yielding seeds. So far, in the tribal villages, tribal farmers motivated towards crop diversification and promoted millets with the distribution of Jowar seed varieties (MJ278, CSV 29 R, CSV 26 R); pluses crop with the distribution of Green gram seed varieties (WGG 42), Bengal gram seed varieties (NBeG 3), Redgram seed varieties (WRGe- 97, Hanuma), Redgram seed was promoted as intercrop in Cotton; Oil crops with the distribution of Sesamum seed variety (JCS 1020); cereals with the distribution of Paddy varieties (Improved Samba Mashuri, KNM1638, JGL 24423, JGL 18047, RNR 15048). Provided additional income through promotion of orchards

with the distribution of Mango and Guava saplings; kitchen gardens in the backyards with the distribution of Vegetable kitchen garden kits; poultry with the distribution of Rainbow Rooster, Vanaraja, Giriraja. Under this component, land less agricultural labourers were provided income with the distribution of Goats and Sheep's and promoted fisheries with the distribution of fish fingerlings for the farmers having undulated land not suitable for cultivation. Tribal farmers were encouraged towards micro enterprises, created physical assets with the distribution of flour mills, water transportation equipment's. which resulted in good economic returns to the tribal farmers.

Profile characteristics

Age

Table 1: Age of the tribal farmers

Category	Class Interval	Frequency	Percentage (%)
Young	22-35	28	23.33
Middle Aged	36-49	50	41.66
Old age	50-63	42	35.00
Total		120	100

Education

Table 2. Education of the tribal farmers

Category	Frequency	Percentage (%)
Read and write	48	40.00
Illiterate	28	23.33
Primary School	22	18.33
High School	10	8.33
Intermediate	7	5.83
Graduate	5	4.18
Total	120	100

RESULTS AND DISCUSSION

In the selected 14 villages, 120 farmers were selected and studied the profile characteristics and the details were given the tables below.

From the table 2, it is observed that, majority (40.00%) of the farmers can read and write followed by illiterate (23.33%), Primary school (18.33%) rest other farmers having more than high school education levels. The reason could be that most of them were fall under middle to old age so does the lower educational levels in tribal areas.

From the table 3, it is indicated that, majority (43.33 %) of the farmers having 5-10

acres of land followed by 2.5-5 acres of land (30.83%), > 10 acres of land (12.50%),1-2.5 acres of land (8.33%).

From the table 4, it is observed that, majority of the farmers having farming experience from high (55.83%) to very high (30.00%) followed by medium to low farming experience. Because, majority of the farmers having agriculture as their main occupation and middle-aged farmers, farming experience found to be high to very high i.e., more than 10 years.

Form the table 5, it is indicated that, majority (46.67%) of the farmers fall under medium level of annual income followed by high (37.50%) and low (15.83%). Since most of the sample farmers land loadings are between 5 to 10 acres and above. The other reason for fall from high to medium because of lack of knowledge on the good management practices.

From the table 6, it shows that, Majority (81.66%) of the farmers had no training about the aspects related to agriculture and allied activities and no motivation to the about the farmers on adoption of the new management practices.

Land Holding

Table 3: Land holding of the tribal farmers

Category	Frequency	Percentage (%)
Landless	6	5.00
1-2.5 acres	10	8.33
2.5-5 acres	37	30.83
5-10 acres	52	43.33
> 10 acres	15	12.50
Total	120	100

Farming experience

Table 4: Farming experience of the tribal farmers

Category	Class Interval	Frequency	Percentage (%)
Low	0-5	6	5.00
Medium	5 – 10	11	9.17
High	10 – 15	67	55.83
Very high	>15	36	30.00
Total		120	100

Annual Income

Table 5: Annual Income of the tribal farmers

Category	Class Interval	Frequency	Percentage (%)
Low	25000-55000	19	15.83
Medium	55000-85000	56	46.67
High	85000-115000	45	37.50
Total		120	100

Training undergone

Table 6: Training undergone by the tribal farmers

Category	Frequency	Percentage (%)
Yes	22	18.34
No	98	81.66

Number of crops grown per year

Table 7. Number of crops grown per year by the tribal farmers

Category	Frequency	Percentage (%)
Single crop	89	74.17
More than one crop	31	25.83

Extension contacts

Table: 8. Extension contact of the tribal farmers.

Category	Class Interval	Frequency	Percentage (%)
Low	12-14	78	65.00
Medium	9-11	34	28.33
High	6 – 8	8	6.67
Total		120	100.00

Level of Knowledge

Table: 9. Distribution of the respondents based on their level of knowledge on new technologies (N=120)

S. No.	Level of Knowledge	Frequency	Percentage (%)
1	Low	68	56.66
2	Medium	33	27.50
3	High	19	15.84
	Total	120	100

Extent of adoption

Table: 10. Distribution of the respondents based on their extent of adoption of new technologies (N=120)

S. No.	Extent of adoption	Frequency	Percentage (%)
1	Low	69	57.50
2	Medium	40	33.33
3	High	11	9.17
	Total	120	100

From the table 7, it clarifies that, majority (74.17%) of the farmers growing single crop in a year followed by more than one crop (25.83%).

From the table 8, it is observed that, majority (65.00%) of the farmers having low extension contact followed by medium (28.33%) and high (6.67%). Majority of the farmers having low education levels.

From the table 9, it is indicated that, majority (56.66%) of the farmers having low level of knowledge on new technologies on followed by medium (27.50%) and high (15.84%). Most of the farmers having low knowledge on the new technologies mainly due to lack of training and motivation from the family, department and poor extension contact.

From the table 10, it is observed that, majority (57.50%) of the farmers having low level of adoption of new technologies followed by medium (33.33%) and high (9.17%). Here, the farmers having low knowledge and low extension contacts, low education levels. Hence forth, low adoption of the new technologies.

With the distribution of the Jowar seed to the tribal farmers and when it is compared with the locally available Jowar seed and the details were shown in the table 11.

From the table 11 it is clearly indicated that, a total of 209 farmers were benefitted with the distribution of improved Jowar varieties. With the cultivation of Jowar improved varieties, 209 Gond tribal farmers received an amount of Rs.

Table: 11. Comparative analysis of distributed varieties (MJ 278 and CSV 29 R) with the locally available Jowar variety.

Sl. No.	Particulars	Distributed varieties (MJ 278 and CSV 29 R)	Locally available Jowar variety
1	Land preparation	1200	1200
2	Seed	0	600
3	Manures	-	-
4	Chemical fertilizers	2100	1300
5	Insecticides and Pesticides	1500	-
6	Machine labour	-	-
7	Human labour	3200	2400
8	Miscellaneous expenses	2400	1800
9	Total cost of cultivation	10400	7300
10	Yield q/acre	8.5 quintals	5.1 quintals
11	Market Price (Rs./ q)	2220	2220
12	Gross returns	18870	11322
13	Net returns	8470	4022
14	No of beneficiaries	209	209
15	Amount	1770230	840598
16	Difference of amounts: (Improved varieties amount- Local varieties amount)	Rs. 929632 @ Rs. 4448 per individual per acre.	

929632 in excess when compared to cultivation of locally available Jowar varieties i.e., each individual farmer benefitted with an amount of Rs. 4448.00 per acre with the cultivation of improved Jowar varieties MJ 278 and CSV29 R than with the cultivation of local Jowar varieties.

CONCLUSION

Initially in the year 2019-20, KVK Bellampalli adopted 14 villages in the Tiryani mandal where the extension contact of the farmers is low, in the year 2021-22 the same farmers having the extension contact as high. Tribal farmers were given continuous off and on campus training programme convinced the farmers and made them to cultivate Redgram as intercrop in cotton and majority of the farmers were showed interest towards cultivation of high yielding crops. Due to continuous focused group discussions and face to face interactions with the tribal farmers, the resulted in the medium to high Knowledge level of the farmers, whereas the Skill

of the farmers is low to medium, attitude of the farmers is positive and adoption status is low to medium.

Likewise, Krishi Vigyan Kendras established in the ST beneficiary districts of the country implementing the TSP in the DFI villages to the targeted stakeholders in an integrated way specifically more focus was emphasized on skill training programmes, demonstrations, and creation of physical assets/Micro enterprises like Goatary, sheep units, apiculture, integrated farming system with two or three components, dairy, distribution of farm implements, value additions units which intern improve the livelihood security,socio economic condition and convert the tribal farmers as agri-entrepreneurs. By the year 2022, from the activities so far conducted and from the outcome of the KVKs under Tribal Sub Plan, it clearly shows that, TSP will take over the lead portion in doubling the income of the famers and improve the livelihood security of the farmers. KVKs acts as the torch bearers to the future agriculture in India.

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IMPACT OF COVID-19 ON MARKETING BEHAVIOUR OF MANGO GROWERS IN PRAKASAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

Marketing involves assembling, storing, processing, packaging, grading, transportation and distribution of agricultural commodities from farmers to consumers. Marketing plays an important role in accelerating the pace of economic development of farmers. The present study mainly deals with the impact of COVID-19 on marketing behaviour of mango growers in Prakasam district of Andhra Pradesh. The paper deals with changes that occurred in marketing behavior before and during pandemic, problems faced by the mango growers during pandemic. The study area was selected by purposive sampling and 50 respondents were selected randomly from three villages. The impact of pandemic on marketing behaviour was analyzed with the help of frequency, percentage and paired t-test using SPSS software. Before pandemic 78.40 per cent of mango growers sold their produce when prices are attractive,80.00 per cent sold to the export organization,86.00 per cent to nearby town,78.00 per cent by means of tractor and 82.00 per cent received their market information through fellow farmers. During pandemic, 80.00 per cent of the respondents sold their produce immediately after the harvest, 84.00 per cent of mango growers sold directly to the consumers, 64.00 per cent sold to nearby villages, 64.00 per cent sold by means of other transport sources, 78.00 percent received their market information through social media. Indicators of marketing behaviour such as time of sale, mode of sale, place of sale, mode of transport, source of market information had significant mean difference and showed decrease in mean values during pandemic when compared to before pandemic. The findings of the study revealed that there is a significant impact of pandemic on marketing behaviour of mango growers. Major problem faced by the mango growers during pandemic is inadequate transport facilities (Garrett score 69.32) followed by export organizations remain closed(67.68) and fluctuations in price(60.54).

Key Words: Impact, Mango, Marketing behaviour, Pandemic.

INTRODUCTION

Agriculture is the most imperative part of the Indian economy. The Agriculture and allied sectors contributed approximately 17.8 per cent of India's GVA at current prices during 2019-20(Anonymous,2020).The Horticulture division contributed nearly 30.4 per centto the country's GDP and become a key driver for economic development. Horticulture production rise by 1.8

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per cent that is 329.86 MT in 2020-2021(Anonymous, 2021). Mango is the National fruit of India. It is also known as “King of Fruits” which has imbibed in our traditions and culture deeply. India is the largest producer of mangoes and also lead exporter of fresh mangoes around the world. The country has exported 21,033.58 MT of fresh mangoes to the world for the worth of Rs.271.84 crores/36.23 USD Millions during the year 2020-21(Anonymous,2021). The major mango-growing states were Andhra Pradesh, Uttar Pradesh, Karnataka, Bihar, Gujarat and Tamil Nadu. Andhra Pradesh stands second in the country next to Uttar Pradesh in mango cultivation with an area of 332.97 ha, 3163.32 MT (HSD 2017).

The impact of COVID-19 on Indian agriculture was widespread to various crops. Among them mango crop was one of the most affected because the harvesting period coincided with both lockdowns in the country during 2020-21. COVID-19 has majorly impacted the marketing of the produce because the traders and buyers come from across the country and due to lockdown implications, the marketing has declined. Along with these other factors such as labour shortage, no transport facilities, closure of mandis across the country have caused the reduction of marketing of produce. In addition, important services related to marketing of mangoes like Insurance, way bill and challans issuing authorities, state permits are non-functional in the country(Nirmallya mandal, 2020). The present study deals with impact of COVID-19 on marketing behaviour of mango growers and problems faced by mango growers during the pandemic period in marketing the produce in Prakasam district of Andhra Pradesh.

MATERIAL AND METHODS

The study was conducted in Prakasam district of Andhra Pradesh state during the year 2020-21.Prakasam district is purposively selected for the study as it ranks second in area and production of mango in the Andhra Pradesh state. Further three villages i.e., Bhimavaram, Kollurupadu, Atmakur were purposively selected from the Ulavapadu block as they are having major portion of area under mango cultivation. By simple random sampling method, 50 respondents were selected from three villages. Research design used for the study was Ex-post facto research design. Data was collected using well-structured interview schedule by employing personal interview method. Data collected was on different categories including time of sale, place of sale, mode of sale, mode of transport, source of market information and problems faced during the pandemic period. Statistical tools like frequency, percentage, paired t-test and Garrett ranking were used. Data was analysed by using SPSS software Package.

RESULTS AND DISSCUSSION

The data presented in the Table 1 showed that marketing behaviour of mango growers revealed that (78.4%) of respondents sold their produce when the prices are attractive before pandemic. Whereas during pandemic majority of the respondents (80%) sold their produce immediately after harvest.

Regarding mode of selling mango produce, (80%) of respondents sold their produce to the export organizations followed by commission agents (66%) before pandemic, but during pandemic (84%) of respondents sold their produce directly to the consumers followed by wholesalers (70%).

Table:1 Distribution of mango growers according to their marketing behaviour (n=50)**

S. No.	Categories	Before pandemic		During pandemic	
		No.	%	No.	%
I. Time of sale					
1.	Before harvesting of produce	34	66.70	15	30.00
2.	Immediately after harvest	29	56.90	40	80.00
3.	When prices are attractive	40	78.40	17	34.00
II. Mode of sale					
1.	Consumers	21	42.00	42	84.00
2.	Contractors	32	64.00	25	50.00
3.	Wholesalers	27	54.00	35	70.00
4.	Commission agents	33	66.00	29	58.00
5.	Export organization	40	80.00	21	42.00
6.	Value addition	30	60.00	19	38.00
III. Place of sale					
1.	Field	27	54.00	22	44.00
2.	Village	29	58.00	32	64.00
3.	Town	43	86.00	28	56.00
4.	Other state/District	40	80.00	24	48.00
IV.Mode of transport					
1.	Auto	33	66.00	27	54.00
2.	Tractor	39	78.00	21	42.00
3.	Lorry	29	58.00	16	32.00
4.	Others	12	24.00	32	64.00
V. Source of information					
1.	Fellow farmers	41	82.00	21	42.00
2.	Input dealers	28	56.00	12	24.00
3.	Print media	34	68.00	33	66.00
4.	Social media	17	34.00	39	78.00
5.	Extension personal	20	40.00	25	50.00
6.	Middlemen	37	74.00	22	44.00

**Multiple responses

Impact of COVID-19 on marketing behaviour of mango growers

Table 2.1: Distribution of respondents according to time of sale

(n=50)

S.No.	Category	Mean	SD	SE
1.	Time of sale before pandemic	2.06	0.4699	0.06
2.	Time of sale during pandemic	1.44	0.5014	0.07
	Mean difference	0.62	0.5674	0.08
				t-value=7.72**

With regard to place of sale, majority of the respondents sold their produce to nearby town and other districts or states with (86%) and (80 %) respectively before pandemic, more than half of the respondents (64%) sold their produce in their villages itself during pandemic.

More than three-fourths (78%) of the respondents used tractor for transporting their produce followed by auto (66%) before the arrival of pandemic, whereas during pandemic (64%) of the respondents used other sources for transporting their produce. Regarding market information vast majority (82%) of the mango growers came to know the price trends in the market through fellow farmers followed by middlemen (75%) before the pandemic arrival. The results are in accordance with the findings of Muthu Kumar and Thiyagarajan (2010) and Raja kala et al (2020). Whereas during the pandemic three fourths (78%) of the respondents were received the market information through social media followed by print media (66%).

Impact of COVID-19 on marketing behaviour of mango growers

From the above table 2.1, it was concluded that there existed a significant difference in the mean values of time of sale before arrival of pandemic and during pandemic. Most of the respondents leased out their orchards to the contractors to avoid risk in marketing the produce, remaining respondents preferred to sell their produce when the prices were attractive in the market before pandemic. During pandemic most of the contractors didn't take up the pre-harvest lease of mango orchards due to lack of storage units in the study area. Due to the perishable nature of the fruits and low keeping quality, most of the respondents sold their produce immediately after harvest. These were

Table 2.2: Distribution of respondents according to mode of sale

(n=50)

S.No.	Category	Mean	SD	SE
1.	Mode of sale before pandemic	3.66	0.9606	0.13
2.	Mode of sale during pandemic	3.38	0.5303	0.75
	Mean difference	0.28	1.0309	0.14
				t-value=1.92

Table 2.3: Distribution of respondents according to place of sale **(n=50)**

S.No.	Category	Mean	SD	SE
1.	Place of sale before pandemic	2.76	0.6565	0.92
2.	Place of sale during pandemic	1.90	0.3642	0.05
	Mean difference	0.86	0.6703	0.94

t-value=9.07**

the probable reasons for the significant difference in time of sale of mango growers.

From the above table 2.2, it could be understood that there existed a difference in mean values of mode of sale. Before pandemic, mango growers sold their harvested produce directly to the export organization and processing industries. Some of the respondents sold their produce to the commission agents who were dealing with export organizations and value addition units. During pandemic, most of the export organizations &value addition units were closed. Due to this large number of respondents sold their produce directly to the consumers. This might be the reason for difference in mode of sale of mango growers.

From the above table 2.3, it was revealed that there was significant difference in mean values of place of sale. It would be mainly because before pandemic immense number of respondents sold their fruits in the nearby towns and sent to other states. But during pandemic most of the harvested produce were sold in the village itself by mango growers. The possible reasons were imposing lockdown across the country, reduced transport facilities both inter-state and intra-state.

From the above table 2.4, it was observed that there was significant difference in mean values of mode of transport of mango growers. The possible reasons were before pandemic most of the respondents preferred to use the tractor, auto and lorry to transport the fruits. But during pandemic lockdown was imposed and public transport got affected, many respondents used other sources to transport their produce to nearest markets and villages. The other sources mainly used by the mango growers during pandemic were bicycle, motorcycle, and car.

Table 2.4: Distribution of respondents according to mode of transport **(n=50)**

S.No.	Category	Mean	SD	SE
1.	Mode of transport before pandemic	2.24	0.7969	0.11
2.	Mode of transport during pandemic	1.88	0.4351	0.06
	Mean difference	0.36	0.7494	0.10

t-value=3.39**

Table 2.5: Distribution of respondents according to source of market information **(n=50)**

S.No.	Category	Mean	SD	SE
1.	Source of market information before pandemic	3.64	0.7761	0.10
2.	Source of market information during pandemic	3.02	0.6848	0.09
	Mean difference	0.62	0.8053	0.11

t-value=5.44**

From the table 2.5, it could be inferred that there existed a significant mean difference in the sources of market information of the mango growers. Before pandemic fellow farmers, middlemen, print media were the major sources for any market related information. Whereas during pandemic, due to farmer's inability to have general meetings and discussions outside, they mostly relied on print media and WhatsApp groups formed by the Farm Assurance Centres (Rhythu Barosa Kendras). These might be the reasons for the change in the preferences of source of market information by the mango growers.

The data in the Table 3, revealed that major problem faced by mango growers during pandemic was inadequate transport facilities (69.32) given rank I, followed by export organizations remains closed (67.68) ranked II. Similarly rank III was given to the fluctuation of prices in the market (60.54). The results were in accordance with the findings of Manjunath et

Garrett ranking

Table 3:Marketing problems faced by mango growers during pandemic **(n=50)**

S.No.	Marketing problems	Garrett score	Rank
1.	Inadequate transport facilities due to rules and regulations imposed by government during pandemic	69.32	I
2.	Export organizations remained closed	67.68	II
3.	Fluctuation of prices	60.54	III
4.	Value addition units remained closed	45.02	IV
5.	High commission charges by traders	42.24	V
6.	Low market demand for fruits	37.56	VI
7.	Input shops were closed due to lockdown	27.78	VII

al(2017), Katole *et al.* (2018) and Sashidhar *et al.* (2020).

CONCLUSION

COVID-19 pandemic had affected both production and marketing aspects of mango growers. Due to temporary shutdowns and rules imposed by the government during lockdown, mangoes were not exported to foreign markets. So the farmers sold their produce directly to consumer and in some areas, produce reminded as such in the field. The suggestions might be moving towards group action for storing the produce and gathering market information from farm assurance centres would be helpful for the farmers in this difficult period. Respective state governments in the country can take initiatives for the benefit of both producers and consumers.

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MOBILE BASED MONEY MANAGEMENT APPLICATION FOR FARMERS

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ABSTRACT

All of us manage our incomes as best as we can to the extent of our knowledge. We have special mobile apps to help us do so. Whether to save or invest. We have apps to tell us where to save or invest too so that we get best returns. When we protect and use our money so wisely, is it not fair for farmers to have an app to help them do so too? An app which will help the farmer plan out his budget for the crop according to his income and resource availability. In addition to this the app will provide him up to date knowledge and information regarding agriculture. Market conditions, glut situations of crops etc. ICT has improved to a humongous extent and it should be used to its full capacity to help farmers become economically stronger and better at handling their money. Building an app to log all the activities a farmer does day in and day out on his field, analyse this data to show whether the farmer is efficient in his resource use or not is very useful. With prolonged use of the app, farmers will automatically shift to the efficient way of cultivating crops on their farm. As the app will take into consideration the specific resources available with the farmer, it will be a unique and personalised plan for that farmer only. Along with the money management part other guidance like agronomical, pest & disease management, weather forecasts, other opportunities to sell his produce, current news in the field of agriculture, scheme and loan information can be made available on the app. This will serve the farmer as a one stop app for everything he requires. Animal husbandry, sericulture, mushroom cultivation and other entrepreneurial activities can be included into the analysis of the app to help the farmer rotate inputs between various activities. Looking at how this is a big undertaking, it will lead to collaboration with government organisations for the spread and implementation of schemes, employment generation for agricultural graduates to help maintain, update and run the app.

Keywords: ICT, money management, income, farm decisions.

BACKGROUND OF THE STUDY

Agriculture in India was always looked at as a way of life and less so as a business possibility. Then, commercialization of agriculture was done by Britishers to facilitate industrial revolution in England. Indian farmers were subjected to unfair and lawless land revenue systems created by the British. The commercialization was done forcefully and without

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giving the farmers a choice in it. Coupled with poor agricultural organization, obsolete technology, and lack of resources among most peasants, commercial agriculture did more harm than help financially to farmers.

After independence, GOI, realizing the necessity to be self-sufficient, initiated a series of agricultural revolutions to increase productivity. The main one being the Green Revolution. Green Revolution was started to accomplish increased productivity of rice and wheat mainly, to reduce dependency on imports, reduce malnutrition and hunger in India. It was characterised by capital intensive technology of using exotic varieties of seeds, existence (or creation) of assured irrigation services, use of modern inputs like chemical fertilizers and pesticides etc (G R Saini, 1976). Despite such revolutions, the current economic status of farmers remains unfortunate owing to factors such as diminishing scale of production, deceleration in technological gains, rising input prices, high frequency of harmful climatic events, volatile prices for output, no scope for non - agricultural income improvements (P S Birthal, 2019). Realizing the progress of income disparities between farmers, GOI in its 2016-17 budget indicated a change of agri-policies towards economic betterment of farmers by reducing excessive importance on increasing agricultural production. The target set is to double farmer's income by 2022-23.

LITERATURE REVIEW

Income trends of farmers

Vatta and Budhiraja (2020) in their research on income trends of farmers have found that the income of farmers grew at 3.7% per annum, but it was different based on state and farm class. Vatta and Budhiraja listed a few key points to be focused upon to achieve the target of doubling farmer's income by 2022-23 -

More vulnerable households and regions must be put in the forefront of future agricultural policies towards improving the economic conditions of farmers.

Land resources are reducing and are limited. Therefore, focus should be on resource use efficiency, high value sectors of farming like horticulture and animal husbandry.

Access to technical information, formal extension services to farmers should be made easy. Use of ICT should be done to expand the reach of information.

Adoption of new technologies by farmers

Prajaapti and Shabyasachi (2019) by performing correlation analysis found that adoption of technology is significantly and positively related to coopetitive network, self-efficacy and ease of use of technology, but no significant correlation with status quo bias, perceived usefulness of technology.

Kishore (2018) has discussed why farmers adopt some technologies very well but at the same time reject others. The 2 factors he mentions are poor communications of science to farmers and usage of distortionary subsidies to promote new technology. When poor quality science, uninformed by even basic economics, is communicated to farmers, in a format alien to them, the outcome will be completely opposite to what is expected.

Efficiency of production by farmers

Pradhan and Mukherjee (2018) have

calculated TE for 2 seasons of crop in India which are almost a decade apart. Using the right seeds, correct quantity of fertilizers and irrigation facilities are directly influencing the output of farms. More informed farmers are less locked in the older process. Therefore, it suggests that education enhances skills and innovations which are useful in terms of the allocation of inputs in a rapidly changing technological environment and then it increases farm efficiency.

Bhoi *et al* (2021) have analysed the TE of paddy cultivation throughout India. TE is varying from 0.64 in Gujarat and 0.95 in Odisha. Inputs like human labor, mechanical labor, fertilizer, irrigation and insecticide were found to determine the yield in paddy cultivation across India (except for Chhattisgarh). Inefficiency in the paddy production in Punjab, Bihar, West Bengal, Andhra Pradesh, Tamil Nadu, Kerala, Assam, Gujarat and Odisha in 2016–2017 was caused by technical inefficiency due to poor input management.

Effect of mobiles on Indian farmers

Mittal and Mehar (2012) investigated the effect of mobile phones on growth of small farmers in India.

Better connectivity to markets and price realizations - 87.2% of the farmers feel they are better connected to the markets after the introduction of mobile phones while 71.7% of the farmers now have better access to the price information.

Reduced search, transaction and search costs - An integrated mobile platform for knowledge and information can help in strengthening the value chain and help the farmer gain by reducing transaction costs

Panda *et al* (2019) listed the major advantages for farmers by using mobile phones for production purposes as follows -

1. Reduction in production cost of crop cultivation

2. Higher productivity or yield

3. Improved farming practices

4. Helps in build up marking linkage

At the same time some constraints which hinder using mobiles are as follows -

1. Difficulty in mobile phone operation, mainly for the illiterate farmers and also in case of new android phone.

2. Difficulty in power (Electric) charging, disturbance of electric power in the rural area is a common problem.

3. Weak strength of network or call drops in the rural area.

4. Lack of mobile friendly and locally relevant digital content in local languages.

Objectives

Use ICT to help farmers manage their agricultural activities in a systematic and easy way.

Generate accurate awareness in farmers regarding current credit facilities, schemes, technological advancements.

Help farmers manage a day to day log book regarding the agricultural activities performed on their farm.

Information and Communication Technology (ICT) proposed - Mobile based application to help farmers manage their farm.

A mobile application which will help farmers run their farms like an actual enterprise. The basic use of the application will be for managing the farmer's money. Just as we have e-passbooks, online loan and repayment facilities, repayment schedule planner, interest calculator etc, the aim is to provide such essential tools for the farmer. For basic information regarding farmer the following data can be taken -

Land holding

Budget for next crop

Income earned through previous crop

List of crops generally cultivated

Resources owned - irrigation, machinery, livestock etc

What is he planning to grow in the next season? The following things are to be incorporated in the app -

Record maintenance - this habit of maintaining account of each and every activity the farmer is doing. When an activity was done, how much was spent on it should be recorded in the app by the farmer. How much he has spent, how much he is remaining in his budget, is he over spending on any activity, is he not spending enough, all these information can be given.

Loan help - farmers need correct information regarding the loans available to them. What conditions are put on the loans, how it will affect the farmer, what interest rate is it at etc. Also loans from several banks must be shown and it must be so that the farmer can apply for a loan online easily.

Schemes - government has gone over and beyond in creating schemes to benefit each and every type of farmer. Implementation is the problem. Inside the app, the farmer must be able to find all schemes he is eligible for based on his income, land holding, crop grown, facilities he has etc.

Market information - demand and supply conditions of the market, price information for the past, which markets he can sell at, other options of selling

Selling plan - by using the details of how much yield the farmer has got and the current market demand and price situation, a selling plan can be formulated to help the farmer calculate when and where to sell and how much to sell. Such a plan can help farmers avoid distress sales.

Warehousing and storage - yield which farmers do not sell immediately can be stored. Information regarding storage services available near to him can be shown. Such storage and warehouse receipts can be used to avail loans in banks.

Processing - based on what kind of crop the farmer has grown, options can be presented to him which he can follow instead of direct selling at market.

In general, all the required instructions from sowing till harvest can be included in the app to help the farmer within his budget limitations on each activity.

Farmer details -

Land details - land holding, type of land holding (rental/own/leased), crops grown,

previous crop grown, cropping intensity, type of farming practiced, source of water.

Capital details - budget limit, details of loans taken (if any), interest rate and repayment period of the loans taken (if any), non - agricultural income (if any)

What kind of guidance he is looking for - financial guidance will be mandatory in the app. He can also choose for agronomical, insect disease related, harvest related etc.

What farmer wants to grow next - type of farming, type of crop etc

Cultivation details -

Previous crop details - cereals, pulses, oil seeds, heavy feeders etc - this will help in guiding the farmer to pick the next crop keeping in mind the effects of previous crop on soil.

This suggestion can be modified by taking into account the monetary status of the farmer regarding how much he can spend.

By taking into account what kind of farming the farmer is opting for and the kind of crops he wants to grow the guidance can be altered for each farmer.

After crop selection - after the farmer selects a crop from the previous guidance, the following advice can be given.

Seed - informing the farmer the seed rate of the crop and the range of amount he should spend on seeds to be efficiently utilizing his money.

Labour utilization - give a detailed explanation about how much labour to use or which machine to use to be efficient.

Fertilizer - based on the data of previous crops and current crop

- the RDF can be shown and also the range of money to be spent on it.

Any special intercultural activities if necessary.

Weather details - details regarding the current day's weather and past weather if any which might affect prices in the market. Depending on the effect of weather, farmers can decide whether to sell or not, where to sell and other decisions.

Knowledge bank - according to the geographical location of the farmer what else can he cultivate, new technologies to improve production and resource efficiency, new varieties, new schemes launched, agricultural news.

Effect of creating such a mobile based application

Availability of such detailed information regarding the farmer will help to create personalised crop plans for each farmer. And this will take into account his land size, resources etc from the start.

Such a database can also be used to do further research to analyse where the bottleneck of Indian agriculture is.

Such an app will cultivate the habit of managing a farm as an enterprise for the farmer. Such a mindset will help him make decisions with a profit earning mindset.

It will make the farmer aware of current technologies and ongoing work in his field of business.

Shift the perspective of agriculture even for small and marginal farmers as a business and not just selling of what they grow.

Helps to slowly develop in the farmer, the habit of looking at every activity done as a way to save money or increase production on his farm.

He will get a major sense of self worth by looking at all the improvements being done in agriculture and realize the important place he holds in society.

One platform for all requirements making it easy and efficient for farmers to gain knowledge and put it into action.

CONCLUSION

We need to include all the latest forms of technology to solve the problems of farmers. Building such an app will be the first step to analyse and formulate unique plans suitable to the needs of a particular farmer. Money management is the way to go forward because all types of productivity improvement technologies have been tried by the farmer, it has helped India reach the current status it has globally in the world. But yet, our farmers remain poor. Unless they learn how to manage what they earn and start looking at their farms as a business they run things will not change or the better. Giving them control and knowledge based decisions will help them turn their incomes around.

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ANALYZING KNOWLEDGE AND ADOPTION GAP OF CLIMATE RESILIENT ADAPTIVE PRACTICES FOR AGRO-CLIMATIC ZONES (8 &9) OF KARNATAKA

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ABSTRACT

In the current situation disasters are frequently occurring due to human activities that degrade the environment. Drought and flood are such adversities that we are encountering frequently in the study region. Agriculture is more vulnerable to such weather aberrations which cause huge losses to agriculture and livestock production affecting livelihood of the poor. Therefore, it is of utmost importance to enhance the resilience of Indian agriculture to climate change. Resilience is the ability of a system to absorb shocks and recover as quickly as possible to normal conditions when external environment improves. Contingency crop plan for provide alternate crop or cultivar choices in tune with the resource endowments of rainfall and soils in a given location. Keeping this in view present study was conducted to know the knowledge and adoption gap of climate resilient adaptive strategies. Results of the study revealed that, knowledge gap was observed to be more with respect to spraying of anti-transparent, KNO_3/K_2SO_4/KCl (1%), zero tillage drill sowing and conservation practice by opening dead furrow for every 10 rows. Adoption gap was more in zero tillage drill sowing, seed hardening, with $CaCl_2$ (2%), spraying of KNO_3/K_2SO_4/KCl (1%), spraying of anti-transparent, contour cultivation, relay cropping of Rabi crops, conservation practice by opening dead furrow for every 10 rows, removal of alternative rows, seed pelleting, protective irrigation /life saving irrigation planofix (TIBA/CCA)/PGR spray, furrow opening ridge tieing and altering line spacing. For flood conditions, knowledge gap was observed to be more for the practices such as spraying of growth retardants, fumigation for stored grain pests and hormonal spray for retention of flower. With respect to fodder and livestock related contingency practices adoption gap was more with respect to providing vitamin C or electrolyte, storing bagasse in sugar factories godown and mobile emergency veterinary hospitals. The main reason for low adoption gap is poor economic background of the farmers who are not ready to invest on additional conservative practices. They try to get maximum with available minimum inputs if it is not possible they will quit and diverted to other sources of income.

Key words: Adoptive, Climate, Contingency, Knowledge gap, Resilient

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INTRODUCTION

In the current situation disasters are frequently occurring due to human activities that degrade the environment. Degradation may be in the form of loss of vegetation (deforestation). When deforestation occurs in a particular area, there are no more trees to help soak up precipitation and reduce water flow over the landscape. Without these natural protections, there is an increased risk of flooding and erosion whenever it rains. Huge amount of agricultural land is being brushed away and crops go under water through river erosion, sedimentation and inundation caused by the floods. Agriculture sector is mostly affected during flood. The foremost adverse effect of flood on agriculture is water logging in the cropping area and soil erosion. Another adverse climatic activity is drought. Droughts is also a natural event, its frequency of occurrence, length of the period and the intensity of its effect has been increased due to climate change which intern the result of anthropogenic activities in a specific area. It is a slow-onset disaster characterized by the lack of precipitation, resulting in water shortage. Drought can have a serious impact on health, agriculture, economies, energy and the environment. Rising temperatures caused by climate change are making already dry regions drier and wet regions wetter. In dry regions, this means that when temperatures rise, water evaporates more quickly, and thus increases the risk of drought or prolongs periods of drought. Between 80-90% of all documented disasters from natural hazards during the past 10 years have resulted from floods, droughts, tropical cyclones, heat waves and severe storms.

Climate change projections up to 2100 for India indicate an overall increase in temperature by 2- 4^0C with no substantial change in precipitation. However, different regions are expected to experience differential change in the amount of rainfall in the coming decades (Kavikumar, 2010). Climate change impact on water resources, a warmer climate will modify the hydrologic cycle, altering rainfall, magnitude and timing of run-off. Warm air holds more moisture and increase evaporation of surface moisture. With more moisture in the atmosphere, rainfall and snowfall events tend to be more intense, increasing the potential for floods. However, if there is little or no moisture in the soil to evaporate, the incident solar radiation will lead to increase in the temperature, contributing to longer and more severe droughts (Trenberth, 1999 and Mall et al. 2006). Delayed onset of monsoon, mid season drought and terminal droughts in rainfed areas are causing huge losses to agriculture and livestock production affecting livelihood of the poor. Fall in yield of staples and consequent shortage of food grains lead to price rise and inflation affecting the poor most. Therefore, it is of utmost importance to enhance the resilience of Indian agriculture to climate change. Resilience is the ability of a system to absorb shocks and recover as quickly as possible to normal conditions when external environment improves. Both application of improved technologies and new policies will contribute to the resilience. The contingency plans are useful for preparedness and real time implementation towards sustainability agriculture production system in the events of weather aberrations and extreme climatic events. Contingency crop plan for provide alternate crop

or cultivar choices in tune with the resource endowments of rainfall and soils in a given location. In rainfed areas, as a general rule, early sowing of crops with the onset of monsoon is the best-bet practice that gives higher realizable yield. While early season droughts have to be combated with operations like gap filling and re-sowing, mid and late season droughts have to be managed through crop, soil nutrient management and moisture conservation measures. Drought also affects livestock/milk productivity due to shortage of fodder. Appropriate location-specific fodder production strategies go a long way in reducing the adverse impact on livestock which is the major source of livelihood in dryland areas. In this regard it is important to make our agriculture more climate resilient through location specific adaptation practices and mitigation strategies by using available resources and technologies by the stakeholders (farmers). Keeping this in view present study was undertaken to knowledge and adoption gap of these climatic resilient practices are need to be known first. Present study was undertaken to know the adoption gap of CRA practices developed by NICRA.

METHODOLOGY

Selection of study area

Selection of study area was made using rainfall data. Taluk wise rainfall data of two agro-climatic zones (Zone-8 Northern Transition zone and Zone-9 Hilly zone) for 30 years period 1989-2018 was collected from Karnataka State Natural Disaster Monitoring Centre, Bengaluru. Using this data, percent deviation from normal rainfall was computed by using the formula

$$\text{Percent Rainfall deficiency} = \frac{100(Average\ annual\ rainfall - Annual\ rainfall)}{Average\ annual\ rainfall}$$

In Zone-8, out of 11 taluks, Savanur taluk experienced consecutive 4 years drought with rainfall deficiency of -36.34 (2015), -50.50 (2016), -35.52 % (2017) and -31.62 % (2018). So Savanur taluk was selected for the study for Zone-8. Among taluks of hilly zone (Zone-9), Khanapur taluk was selected as it experienced excess rainfall consecutively for three years (+47.77% 2015, +29.15% 2016, +42.98% 2017). From Khanapur taluk four villages (Gastroli, Handur, Kerwad and Ghoshanatti) and from Savanur taluk four villages (Chawdala, Tawarmellihalli, Kunimellihalli and Mannur) were selected. So, totally eight villages were chosen. From each village forty farmers were selected randomly. Total sample was 320.

Climate resilient agriculture practices: We referred district wise contingency plan report of NICRA. This report consists of contingency plan for early season drought (6 weeks), mid season drought (at vegetative stage and at flowering stage), terminal drought situation, flood situation and pest and disease outbreak due to unseasonal rains. We clubbed all the agronomic practices irrespective of the crops and used for the study.

RESULTS AND DISCUSSION

Knowledge gap and adoption gap with respect to contingency agronomic practices for drought situation are practices are presented in table 1. Among the practices in zone 9 (Hilly zone) knowledge gap was observed to be more with respect to spraying of anti-transparent (94.06 %) followed by seed hardening with CaCl2 (2%) (92.81 %), zero tillage drill sowing (92.50 %),

Analysis

$$\text{Knowledge gap} = \frac{\text{Total obtained knowledge scores}}{Maximum\ obtained\ knowledge\ scores} * 100$$

$$\text{Adoption gap} = \frac{\text{Total obtained adoption score}}{Maximum\ obtained\ adoption\ score} * 100$$

spraying of KNO_3/K_2SO_4/KCl (1%) (81.25 %) and seed pelleting (68.75 %). Adoption gap was observed to be more with respect to zero tillage drill sowing (100 %), spraying of anti-transpirants MOP (2%) /Kaolin (1-6 %) (100 %), seed hardening with $CaCl_2$ (2%). (98.75 %), spraying of KNO_3/K_2SO_4/KCl (1%) (98.13 %), seed pelleting (96.88%), removal of alternative rows (90.63%), relay cropping of Rabi crops. (81.25 %), conservation practice by opening dead furrow for every 10 rows (75 %), altering line spacing (75 %) and conservation furrows (66.25 %).

In zone 8 (Northern transitional zone) knowledge gap was observed to be more with respect to spraying of anti-transparent (97.50 %), KNO_3/K_2SO_4/KCl (1%) (96.56 %), zero tillage drill sowing (93.75 %) and conservation practice by opening dead furrow for every 10 rows (65 %). Adoption gap was more in zero tillage drill sowing (100 %), seed hardening, with $CaCl_2$ (2%) (100 %), spraying of KNO_3/K_2SO_4/KCl (1%) (100 %), spraying of anti-transparent (100 %), contour cultivation (98.13 %), relay cropping of Rabi crops (96.25 %), conservation practice by opening dead furrow for every 10 rows (89.38 %), removal of alternative rows (86.88 %), seed pelleting (82. 50 %), protective irrigation /life saving irrigation planofix (TIBA/CCA)/PGR spray (79.38 %), furrow opening ridge tieing (78.75 %) and altering line spacing (65.63 %).

Zero tillage systems in which soil disturbance is reduced to sowing operations and traffic only and where weed control must be achieved by chemical means (Baeumer and Bakermans 1974). Farmers opinioned that because of zero tillage root penetration stop which inhibits growth and affects yield levels. So adoption gap for this practice is very high among the farmers in both the zones of the study area. High herbicide use is the most prominent side effect of zero tillage agriculture today. Excessive herbicide use causes a variety of environmental problems. (Andreas Gattinger et al in 2015). Spraying antitranspirant substances seemed to partially overcome the harmful effects of water stress by retaining more water in the leaves and therefore tremendously improved the water use efficiency (WUE) of the plants. (El-Sayed et al 2013 and Vishal and Shweta, 2020). Anti transparent decreased the transpiration rate at drought sensitive stage and mitigating the unfavourable effects of drought in late-season wheat (Abdullah et al., 2015). Spraying of KNO_3/K_2SO_4/KCl (1%) instead of soil application helps to increase number of panicles, increased grain size, test weight and improved grain yield. Potassium is needed for osmo regulation, enzyme activation, regulation of cellular pH, cellular cation-anion balance, regulation of transpiration by stomata, and the transport

of the products of photosynthesis and ultimately increased the growth parameters (Jothi et al., 2019). Adoption gap for seed hardening with $CaCl_{2\,is}$ very low in the study area. Pre sowing seed hardening treatment is an easy, low cost and low risk technique and also an alternative approach recently used to overcome the effect of abiotic stresses in agricultural production (Sankar Ganesh et al., 2013). During drought situations when moisture is not available during such situation seed hardening will accelerates rapid germination and growth rate of seedling, better root growth, increase crop population, reduces seedling mortality, flowering is slightly accelerated, seeds are able to withstand higher temperature (Kandula Uma Maheswari, 2020). According to Akshay L Kunghatkar et al., 2018 seed hardening showed superior performance in terms of growth & yield attributes. So this practice must be known by the respondents and make use of it during drought situations. Farmers are not ready to spend extra amount of cost on these practices which intern increases their cost of production when returns are not sure because of climatic severity. Therefore farmers are not adopting these practices.

In Zone 9, Knowledge gap was very low (less than 10 %) with respect to AP1, AP2, AP5, AP9, AP14, AP15, Ap17, AP20, AP21 and AP24. These practices are well known by the majority of the respondents. Adoption gap was very low (less than 20 %) with respect to AP2, AP5, AP9, AP17, AP18, AP20, AP21, AP22 and AP24. With respect to practices AP5, AP9, AP14, AP15, AP17, AP18, AP20 and AP24 knowledge gap was observed to be less than 10%. Adoption gap was less than 20 % for the practices such as AP9, AP14, AP15, AP17, AP18, AP20 and AP254.

Knowledge and adoption gap of contingency agronomic practices for flood situation are presented in table 2. Knowledge gap was more (>80 %) with respect to spraying of growth retardants (89.69 %) and fumigation for stored grain pests (89.69 %) at Zone 9. Adoption gap was also more with respect to the same practices. Incidence of store pests will be more when gains are stores at moist places. Fumigation will stop insect infestation and grain degradation from getting progressively worse (Tyagi et al., 2019). Fumigation has no harmful effect on gain even if it is intended to use for seed purposes. Fumigation is not effective unless the storage to be treated is well sealed and the grain temperature is well above 50 degree F (Upadhyay and Ahmad, 2011). Farmers usually don't do fumigation instead they use powder/tablets for storing. Application of growth retardants reduces unwanted longitudinal shoot growth without lowering plant productivity. Most growth retardants act by inhibiting gibberellin (GA) biosynthesis.

In case of Zone 8, knowledge gap was observed to be more for the practices such as spraying of growth retardants (91.56 %), fumigation for stored grain pests (85 %) and hormonal spray for retention of flower (80 %). For the practices F3, F7, F8 and F12 adoption gap was more than 80 % at zone 8. Majority of the flood management practices are commonly known and practiced by the farmers in the study area.

Knowledge and adoption gap climate resilient practices related to livestock and fodder

Table 1.Knowledge and adoption gap of climate resilient adoptive practices for drought situations

Code	Contingency agronomic practices	Zone 9 (Khanapur)		Zone 8(Savanur)	
		Knowledge gap	Adoption gap	Knowledge gap	Adoption gap
AP1	Compartmental bunding for moisture conservation	1.25	42.50	24.38	56.25
AP 2	Contour cultivation	1.88	13.13	34.38	98.13
AP 3	Conservation furrows	43.75	66.25	46.56	61.88
AP 4	Furrow opening ridge tieing	46.88	54.38	43.44	78.75
AP 5	Ridges and furrow method of sowing	2.50	3.13	6.56	33.75
AP 6	Conservation practice by opening dead furrow for every 10 rows	55.31	75.00	65.00	89.38
AP 7	Zero tillage drill sowing	92.50	100.00	93.75	100.00
AP 8	Apply enriched compost (FYM+ press mud + poultry manure)	21.56	21.80	29.69	46.88
AP 9	Increasing the quantity of organics	7.19	8.75	6.88	11.88
AP 10	Seed hardening, with $CaCl_2$ (2%).	92.81	98.75	94.69	100.00
AP 11	Seed pelleting	68.75	96.88	51.88	82.50
AP 12	Altering line spacing	53.13	75.00	32.19	65.63
AP 13	Different methods of sowing	15.94	39.38	10.31	22.50
AP 14	Gap filling	3.75	25.63	2.81	4.38
AP 15	Thinning	5.31	35.63	4.06	11.25
AP 16	Removal of alternative rows	39.69	90.63	35.63	86.88
AP 17	Withholding of fertilizer application till dry spell is over/ Postponement of top dressing with N	5.94	11.88	9.38	10.63

AP 18	Foliar application of nutrients(N/K)	11.25	13.13	9.38	13.75
AP 19	Spraying of KNO_3/K_2SO_4/KCl (1%)	81.25	98.13	96.56	100.00
AP 20	Frequent Inter-cultivation and weeding	0.94	0.00	1.56	1.88
AP 21	Stubble mulching/ Residue mulching/plastic mulch	6.56	17.50	22.81	63.75
AP 22	Protective irrigation /life saving irrigation Planofix (TIBA/CCA)/PGR spray	15.00	15.00	45.63	79.38
AP 23	Spraying of anti-transpirants MOP (2%) /Kaolin (1-6 %) for 2-3 times at 15 days interval	94.06	100.00	97.50	100.00
AP 24	Harvest at physiological maturity.	1.56	0.00	1.56	0.00
AP 25	Relay cropping of Rabi crops.	14.38	81.25	25.00	96.25

management are presented in Table 3. Spraying of fly repellents in animal sheds (53.75 %), providing vitamin C and electrolytes (45.94 %), storing of bagasse in sugar factory godown (45.31 %) and providing fluids and tonic, mineral mixture (44.69 %) are the practices for which knowledge gap was more than 40 % in Zone 9. Adoption gap was >70 % for the practices such as establishment of silvi-pastoral system (Gomala) (90.63 %), goshalas during drought/ flood year (89.38 %), providing vitamin C or electrolyte (83.13 %), storing bagasse at sugar factories (86.88%), bringing feed from fodder banks (75 %) and facilities of mobile emergency veterinary hospitals/ rescue animal health (91.88 %) at Zone 9. Livestock undergo various kinds of stress among them thermal stress is the most concerning now a day in the ever changing climatic scenario. Thermal stress redistributes the body resources including protein and energy at the cost of decreased growth, reproduction, production and health (Qinisa et al., 2011). Vitamin C is known for the function as an antioxidant mainly it act as a free radical scavenger in numerous cellular oxidation processes (Sumeet Kour et al., 2019). Under dehydration, in order to preserve homeostasis renal water and sodium retention is increased to preserve the blood sodium levels. The bagasse has been a valuable al-ternative, and medium-term, and it is unique viable roughage for ruminants (Gleidiana et al., 2018).

In Zone 8, knowledge gap regarding the practices such as providing vitamin C or

Table 2.Knowledge and adoption gap of climate resilient adoptive practices for flood situations

Sl.No.	FLOOD	Zone 9(Khanapur)		Zone 8(Savanur)	
		Knowledge Gap	Adoption Gap	Knowledge Gap	Adoption Gap
F1	Drainage of excess water	1.56	0.00	3.13	5.26
F2	Breaking hard pan	8.44	8.75	14.38	15.25
F 3	Re-sowing	4.38	85.63	42.19	91.25
F4	Inter-cultivation to improve soil aeration	3.75	5.00	5.31	6.25
F5	Top dressing of urea	3.13	3.80	2.81	3.15
F6	Foliar application of N & K application in addition to recommended dose (25%)	13.75	30.63	7.81	18.13
F7	Spraying of growth retardants	89.69	100.00	91.56	98.75
F8	Hormonal spray for retention of flower	61.56	70.00	80.00	82.50
F9	Herbicide spray for control of weeds	11.56	31.25	17.81	57.50
F10	Harvesting at physiological maturity	6.88	7.98	1.56	0.00
F11	Proper drying of produce	5.63	5.63	2.50	0.00
F12	Fumigation for stored grain pests	89.69	100.00	85.00	100.00

electrolyte (60.31 %), storing bagasse in sugar factories godown (56.56 %) and mobile emergency veterinary hospitals (48.44 %) was very high (>40%). Adoption gap was more for the practices such L18 (96.88 %), L11 (94.38 %), L8 (91.88%), L14 (91.25%), L2 (836.75 %), L4 (83.13 %) and L1 (65 %).

CONCLUSION

Climate resilient adaptive practices are useful for preparedness and real time implementation towards sustainability agriculture production system in the events of weather aberrations and extreme climatic events. Even after having knowledge regarding the adaptive

Table 3. Knowledge and adoption gap of climate resilient adoptive practices for livestock and fodder management.

Sl.No.	Livestock and fodder management	Khanapur		Savanur	
		Knowledge Gap	Adoption Gap	Knowledge Gap	Adoption Gap
L1	Growing short term fodder crops like African tall maize, multi cut jowar under irrigation.	26.56	37.50	29.69	65.00
L2	Establishment of silvi-pastoral system (Gomala)	26.56	90.63	19.38	83.75
L3	Change in feeding pattern	6.88	31.25	4.69	14.38
L4	Bringing feed from fodder banks	14.38	75.00	8.44	83.13
L5	Enrich hay with 2% Urea molasses solution or 1% common salt solution and fed to LS	14.69	15.15	14.38	17.50
L6	Feeding as per productivity of the animals	6.56	28.75	7.81	31.88
L7	Feeding kitchen waste along with dry fodder	4.06	5.63	5.00	15.63
L8	Sugar factory store bagasse in their godown	45.31	86.88	56.56	91.88
L9	Shift the fodder away from flood affected areas to higher places	7.50	41.25	15.31	41.25
L10	Allow the animals early in the morning or late in the evening for grazing during heat waves	12.81	16.25	24.69	26.54
L11	Goshalas during drought/ flood year	12.50	89.38	19.38	94.38
L12	Selling or culling old and unproductive animals to overcome fodder scarcity	6.88	35.00	13.13	50.63

L13	Chlorine tabs/ bleaching powders will supply to each panchayat for keeping drinking water clean.	33.44	53.13	39.06	63.13
L14	In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves.	45.94	83.13	60.31	91.25
L15	Water tanks are arranged to supply pure water to the needy place for livestock	17.81	46.88	27.81	57.50
L16	Sheep & Goat are given with deworming drugs.	21.56	51.88	18.75	54.38
L17	Fluids and tonic, mineral mixture are given	44.69	67.50	38.13	45.00
L18	Facilities of Mobile emergency veterinary hospitals/ rescue animal health workers are provided	45.94	91.88	48.44	96.88
L19	Spraying of fly repellants in animal sheds	53.75	50.00	35.31	48.75

measures. Farmers are not ready to adopt majority of the climate resilient adaptive practices because of their low income levels.

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FARMER'S EXPECTATIONS AND GOVERNMENT INTERVENTIONS FOR CONVERSION OF NILGIRI DISTRICT AS "TOTAL ORGANIC DISTRICT"- AN OPINION STUDY

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ABSTRACT

Organic farming is a method of crop and livestock production that involves choosing not to use chemical pesticides, fertilizers, genetically modified organisms, antibiotics and growth hormones. Prohibited products and practices must not be used on certified organic farms for at least three years prior to harvest of the certified organic products. Livestock must be raised organically and fed 100 per cent organic feed. The general principles of organic farming lied in health, care, fairness and Ecology. The India organic food market stood at a value of USD 849.5 million in 2020 and hold 8th position among 172 countries and 1st in total number of producers.

The Nilgiris was located in the Western Ghats and also the first UNESCO-declared biosphere reserve in India. The efforts were being undertaken to protect biodiversity and prevent chemical fertilizers having a knock-on effect on wildlife and also human beings.The Nilgiris District Collector, Ms.J. Innocent Divya, planned to make the district a chemical-fertilizer free, organic district over the next three years from the year 2019. Nilgiri's collector had formed a core committee to initiate the process. Rural development minister of Tamil Nadu had declared the Nilgiri district as 'Total Organic District' in July 2019. This paper focuses on the expectations of farmers for their preparedness to move towards organic farming in Nilgiris.

The current study was carried out in the Nilgiri district of Tamil Nadu, were 2 taluks had been selected purposefully and 1 village from each taluk, which had maximum number of organic farmers. 15 organic farmers from each village were selected and a total of 30 farmers. With the help of well - structured and pre tested interview schedule the data was collected and analysed. The main expectation of farmer lied in undergoing trainings about the procedures of organic farming. Government had bridged up the gap by providing sufficient schemes, financial support as loans, result and method demonstration, T & V system and awareness programmes.

Key words: Organic farming, Nilgiri district, farmer's expectations, awareness, government interventions, opinion.

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INTRODUCTION

"*With wrong farming methods, we turn fertile land into desert. Unless we go back to organic farming and save the soil, there is no future*" - *Jaggi Vasudev*

The term 'Organic' was first coined by Lord Northbourne, in 1940, in his book entitled 'Look to the Land'. He stated that the farm itself should have biological completeness; it must be a living entity and a unit which had a balanced organic lifeNorthbourne (2005). Indian soils were rapidly being degraded in the nutrient status since years. About 90.00 per cent of the soils were presently deficient in micro and macronutrients. Major causes for decline in the productivity of the soil was low organic matter content. To reverse this trend, the possible means was to look out for alternate crop production system like organic farming.Today, there are more than 2.9 million organic producers worldwide, cultivating around 70 million hectares of land, resulting in sales of organic products of over 97 billion US dollars Willer *et al.,* (2019). Organically grown foods had become one of the best choices for both consumers and farmers which was a part of go green life style. Organic Farming was a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives to the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral bearing rocks and aspects of biological pest control to maintain soil productivity and tilt to supply plant nutrients and to control insects, weeds and other pests.The basic principle of organic farming focused on growth, development, health, care, fairness and balanceEyhorn *et al.,* (2019).

Growth of organic farming in India

In India organic food market stood at a value of USD 849.5 million in 2020. The market was further expected to grow at a CAGR of about 20.5% in the forecast period of 2021 and in the year 2026 to reach a value of about USD 2601 million. India holds 8th position among 172 countries practicing organic agriculture and 1st in terms of total number of producers as per 2020 data Bonn (2020).Organic farmers build healthy soils by nourishing the living component of the soil and through crop rotation. Soil-borne diseases were managed by improving organic matter, biological cultural and physical methods such as rotation, sanitation, pruning and selection of disease resistant varieties were all part of organic disease management. Weeds were controlled through crop rotation, mechanical tillage and hand-weeding as well as through cover crops and mulches. Weeds often helped to conserve soil, improve organic matter, and provide beneficial habitat for natural enemies on organic farms Frabboni *et al.,* (2019). The livestock used for organic farming must be raised by providing organic feeds.

Need for change to organics

The arrival of modern techniques and increased burden of population led to a propensity towards conventional farming that involves the use of synthetic fertilizer, chemical pesticides, application of genetic modification techniques Hole *et al.,* (2005).Even in developing countries like India, the demand for organically grown produce was more as people were more aware about the safety and quality of food. The

organic process had a massive influence on soil health, which devoid of chemical pesticides. Organic cultivation had an immense prospect of income generation also Bhardwaj *et al.,* (2019).

Nilgiris as a 'Total Organic District'

The Nilgiris or the Blue Mountains, one of the oldest mountain ranges, was located in the Western Ghats was the first UNESCO-declared biosphere reserve in India and it was the major Bio-Diversity Zone. A major environmental menace was the indiscriminate and unregulated construction across the district. To put a stop to this, a relook at the landslide vulnerable areas was done with the help of the Geological Survey of India (GSI), resulting in earmarking 283 vulnerable locations as no-construction zones or green zones Ramesh *et al.,* (2019).The efforts were being undertaken to protect biodiversity and prevent chemical fertilizers having a knock-on effect on wildlife and also human beings.The Nilgiris District Collector, had said that the district must be chemical-fertilizer free and organic district over the next three years from the year 2019.Nilgiri's collector had formed a core committee to initiate the process. With the collector as the Chairperson the committee comprises Joint Director of Horticulture, Nilgiris, officials from the Tamil Nadu Agricultural University Research Centre, Animal Husbandry Department, Members from Farmers' Association Groups and Pesticides and Weedicides Dealers Association. As a result of it, Rural Development minister S P Velumani had declared the Nilgiri district as 'Total Organic District' in July 2019.The district administration, with the help of the Horticulture Department prepared map detailing the areas where organic farming was being practiced and the Animal Husbandry Department purchased a few hundred cattle and handed over to farmers for using it in organic farming practices to grow their crops.

As a first step, 48 Farmers in the district had been selected by the Department of Horticulture for 'Scope Certification' and they were taken to Sikkim for providing the training about organic farming under Tamil Nadu Government. Later, a group of 20 farmers formed a group, same way 5 group formed together to be a Farmer Producing Organization (FPO).Currently, near about 16,000 farmers were there as members. Each month new farmers were being included under these groups. It would take three years to convert soil into organic however technically five years of continuous bio-fertilization would make soil organic. In Nilgiris, 'red' and 'yellow' tagged chemical pesticides and weedicides were banned and by the end of March 2020 there were no sale of chemicals in the district. Plastic usage was already forbidden from 2001 itself, but came to tenure in 2018.About 19 different kinds of plastic have been banned in the district so far.

Marketing of produce

Government themselves had provided a platform called Primary Processing Centre for selling all the produces. 9 centres were recently working in Nilgiris (recommended for more numbers).The main objective of these centres were aimed at Supply Chain Management (SCM) and these were linked with each FPO. Farmers were also allowed to market their produce themselves without the help of PPC. The marketing factor and government policy had significant impact on the adoption of organic farming, irrespective of their levels of educational qualification.

The national programme involved the accreditation programme for Certification Bodies, standards for organic production, promotion of organic farming etc. National Accreditation Body (NAB) was the apex decision making body. Certification and Inspection agencies accredited by NAB were authorized to undertake certification process. Currently 25 certification agencies had been authorized to undertake certification process. In Nilgiris the certification was provided by Participatory Guarantee Centres (PGC) under Tamil Nadu Organic Certification Department (TNOCD). For the tea growers the certification was provided by Tea Board India under Department of Horticulture named 'Tasty Tea' by focusing mainly the factory owners and thereby to through Indcoserve team. Usually the certification procedure will be done by the government ones registered, farmers can also take do the certification process themselves.

The main purpose of this study was to empirically investigate the differential impact of economic, social, marketing, government policy and cultivation factors on the adoption of organic farming in Nilgiri district with respect to farmer's expectation in conversion.

Objectives of the study

- To find out farmer's expectations in conversion of Nilgiri district in to "Total Organic District".
- To analyse the merits and demerits faced by the organic farmers while transforming to organic farming.

Research methodology

Tamil Nadu was one of the major states of the Southern Zone in India which consisted of major agro climatic zones and best suited for agriculture and horticulture. Nilgiris was one of the "Biodiversity Hotspots" as declared by the National Biodiversity Authority in the year 1998. The Nilgiris district had many attractions of its own and known as "The Queen of hill stations" District Human Development report (2011). The green carpet of crops and natural settings always speaks about the various biodiversity of the district provides ample scope for the study. This study is focused on "Farmers Expectations and Governments Interventions for Conversion of Nilgiri District as 'Total Organic District'" in accordance with the objectives of the study. Thus Nilgiris district of Tamil Nadu was purposively selected because it is the district chosen for the conversion.

The study was conducted in the two taluks namely Gudalur taluk which was located at a longitude of $76^{o}\ 30^{1}$ E and latitude of $11^{0}\ 30^{1}$ N and Pandalur taluk, located at a longitude of $76^{o}\ 20^{1}$ E and latitude of $11^{0}\ 29^{1}$ N, with an altitude of 880-950 MSLDistrict Diagnostic Study (2019). In each taluk, one village viz., Devarshola and Erumadwere selected purposively because it had highest number organic farmers. Simple random sampling research design was used in this study which will suit the objectives and type of information needed. Therefore 15 farmers were selected randomly from each of the selected villages to make 30 respondents as samples for the study.

Taking into consideration the scope and objectives of the study a comprehensive interview schedule was prepared. The pre testing of the interview schedule was done with the respondents selected. Refinement was made in the schedule after pretesting as found necessary and it was finalised. Precaution was taken to

ensure that the items were clear, concise, complete, comprehensive and unambiguous thus the primary data collected. Secondary data was collected from the articles, journals and news.The data gathered were quantified and tabulated for statistical analysis.

Findings and Discussion

Expectations in Inversion

Farmers had several expectations in conversion and they were ready to adopt and convert their land in to complete organics thus, Organic farming can provide quality food without adversely affecting the soil's health and the environment. Some of the expectations mentioned by the farmers were listed below and worked out using garret ranking technique.

From the table 1, it was clear that more export opportunities for organic products hold first rank thereby good income can be generated. Disease and pests attacks were considered to be a major issue in organic farming so the farmers were expecting to get the pathogens under control by following the proper cropping pattern and crops, therefore it hold second rank. As most of the people these days were health conscious, they preferred to have organic and naturally grown foods in place of conventionally produced foods, so the demand for organic foods were high in local and international markets,

Table. 1 Expectations of farmers for conversion in to organic district

S. No	Statements	No. of respondents	Average score	Rank
1.	More export opportunities for organic products	30	55.67	1
2.	More possible ways to control diseases, insect pests and weeds occurring in crops	30	55.33	2
3.	High demand for organic products in the local market and international markets	30	55.30	3
4.	Availability and supply of organic fertilizers from government and subsidiaries for the farm equipment	30	55.13	4
5.	Conducting more number of awareness programs to the farmers about the side effects of using synthetic fertilizers	30	54.57	5
6.	Gaining high profit by selling organic produce	30	53.60	6
7.	Making the general public aware of the health benefits of organic farming	30	53.40	7

Table 2. Major merits and demerits faced by the farmers in conversion to organics

*N=30

S. No.	Statements	Percentage (%)	
		Yes	No
1.	Lack of awareness about organic farming and its importance to environment	46.66	53.34
2.	Lack of knowledge about organic production and maintenance	40.00	60.00
3.	Lack of knowledge about insect / pest control and nutrient management in organic farming	23.33	76.67
4.	Lack of knowledge about weed management practices in organic farming	23.33	76.67
5.	Lack of proper guidance regarding the preparation of bio-pesticides / plant vitalizes	33.33	66.67
6.	Lack of knowledge about grading and value addition	43.33	56.67
7.	Lack of timely and appropriate transfer of technology measures	40.00	60.00
8.	Initial investment is high	26.67	73.33
9.	Non-Availability of organic inputs	56.67	43.33
10.	Lack of transportation and marketing facilities	60.00	40.00
11.	Non-Availability of soil/water testing laboratory	53.33	46.67
12.	Non-Availability of organic food testing laboratory	40.00	60.00
13.	More labour is required thus increased cost of production	33.33	66.67
14.	Lack of financial support from government	53.33	46.67
15.	Problems with organic certification	40.00	60.00

which hold third position. Availability and supply of organic fertilizers from government and to provide subsidiaries for the farm machineries hold fourth rank among other expectations. Making the farmers aware of the side effects of using synthetic fertilizers in their field and also the health hazards by continuous usage of these chemicals in eatables, it hold fifth position. The

cost of organically grown products remain way more high so farmers can expect good profit from these products and so it hold sixth rank. Farmers' as well as general public must be aware of the benefits of organic products over conventionally grown, so government must arrange more awareness classes in the schools, colleges and other meetings for the people, so it had seventh rank among other expectations.

Throes and Woes of organic farming

The major merits and demerits of converting into organic farming mentioned by the farmers and asked the government to avail these implications were collected and tabulated in table 2.

By analysing the merits and demerits, listed in the table 2, for the conversion to total organic district, only 46.66 percent farmers out of 30, were knowing about the environmental importance of organic farming and remaining 53.34 per cent were unaware of it. 40.00per cent farmers had the knowledge of organic production and marketing among 30 members but 23.33 per cent members were knowing about the pests, disease and weeds controlling in organic farming. 33.33 per cent, out of 30 farmers were aware of the preparation of bio-pesticides and plant vitalizes. 43.33 per cent farmers were knowing about the grading and value addition of organic produce but only 40.00 per cent members were aware of the timely and appropriate transfer of technology measures. 26.67 per cent among 30 farmers were conscious of the high initial investment for organic farming production. 56.67 per cent members were agreeing to the fact that non availability of organic inputs for production. 60.00 per cent farmers were saying about the issues faced in transportation and marketing of the produce in Nilgiri hills. Non availability of soil and water testing laboratory was one of the major issue and 53.33 per cent farmers were facing it. Organic food testing laboratory was also highly needed in every taluk, but it was available only in 1 taluk, 40.00 per cent farmers among 30, were facing this issue. Labour intensity will be high for the initial days of organic production and 33.33 per cent farmers were knowing about it. Government plays a significant role in promoting the organic production, but half of the farmers (53.33) were facing issue by lacking financial support from the government. One of the utmost important aspect of organic production was the certification of organic produce from the certification body, but 40.00 farmers among 30 members were fronting problems in certification of their organic produce.

POLICY IMPLICATIONS

Government had begun to identify the likelihood that may be cheaper to support organic agriculture than to resolve problems associated with the resource destruction production practices. To support organic farmers, government had introduced subsides for organic agriculture. These subsidies can do direct payment to farmers or indirect help.

Based on the policy drawn, major government schemes for promoting organic farming were listed below:

· Paramparagat Krishi Vikas Yojana (PKVY), Mission Organic Value Chain Development for North Eastern Region (MOVCDNER), Capital Investment Subsidy Scheme (CISS) under Soil Health Management Scheme, National Mission on Oilseeds and Oil Palm (NMOOP), National Food Security Mission

(NFSM), National Programme for Organic Production (NPOP), National project on Organic Farming (NPOF) and National Horticulture Mission (NHM) Market Reports and Forecast (2022-2027).

· Provision of awareness classes for organic farmers under government along with the extension department.

· To reschedule the academic curriculum of the students both on schools and colleges and include about the values and importance of organic farming.

Furthermore, the findings of this study provide that proper guidance about cultivation and methods of crop management with appropriate laboratory facilities were highly important. Farmers had many expectations while adopting and converting the entire district into organics, the main field was providing training facilities, awareness classes, laboratory services and sufficient infrastructure amenities. Government of Tamil Nadu had bought several initiatives and came forward with several development strategies for organic farmers as credit facilities, marketing, certification, mini organic kits, livestock and schemes. Therefore, it was essential to provide the sufficient information regarding the agricultural modernization to sharpen their knowledge required for the means of living, not only for living but also to formalize sustainable livelihood approach.

Suggestions and Recommendations

Farmers had given many suggestions and opinions about the conversion, most repeated recommendations suggested by farmers were as follows:

- More awareness classes about the conversion and benefits of organic farming must be conducted by the extension department in all the taluks and villages.
- The academic curriculum of the students in both schools and colleges must include the welfares and needs of organic farming to our country and the earth.
- Through government and non-government awareness campaigns, inform farmers about the profitability of organic farming compared to conventional or contemporary farming.
- Government has to fix minimum support price for organic produce.
- Assurance of quality organic inputs for cultivation purposes and access to bio-control chemicals for farmers via a credit facility provided by the board.
- As the farmer's number increases in each block, include the number of value addition centres and processing units with good infrastructure facilities.
- Provide knowledge about the export of the produce and market facilities.
- Developing a market for organic produce was crucial to enhance organic farming's overall profitability.
- There should be better communication between the Board, the federations and the farmers.Farmers are more concerned about market and price issues.
- Improving the transportation and procurement systems' efficiency to prevent product loss owing to inefficiencies were the most important suggestions expressed by

more than 80.00 per cent of farmers to follow the eco-friendly agricultural practices.

CONCLUSION

Organic farming can play an important role in rural development by reinforcing the penchant for sustainable agriculture and its role for ecosystem conservation. The effectiveness of organic farming could be particularly relevant for the betterment and wellness of Nilgiri district. Farmers had several expectations in conversion and they were ready to adopt and convert their land in to complete organics thus, Organic farming can provide quality food without adversely affecting the soil's health and the environment. There was a need to identify suitable crops/products on regional basis for organic production that had international market demands. The whole region as such cannot afford to go for organic at a time because of its commitments to insure food and nutritional security.

Organic farmers had asked for several new development policies and taking advantage of the increased value of short marketing circuits. Government alone with the farmers had bought out numerous projects, programs and training classes. They were still working hard to fix minimum support price for organically produced vegetables followed by encourage setting up exclusive organic vegetable marketing centers and developing organic vegetable supply chain system.There was a need to construct infrastructure both technical and financial to motivate farmers to switch to organic farm practices.Also provide more trainings and demonstration classes with good infrastructure laboratory facility. This will provide ample opportunity for employment and thereby bring prosperity and peace in the region.

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EXTENT OF ADOPTION OF WATER MANAGEMENT PRACTICES BY THE FARMERS IN UPPER KRISHNA COMMAND AREA OF KARNATAKA

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ABSTRACT

During 2018-20 this research had carried in UKP command area to ascertain the adoption of water management practices by the farmers. This research study hadconducted in Vijayapura, Raichur and Yadgir districts of UKP Command. From each selected district two taluk had been selected based on highest irrigated area by UKP project. Sindagi and Indi taluk had considered from Vijayapura district, Surpur and Shahapur from Yadgir district and Deodurga and Lingasugur from Raichur district, respectively. From each taluks four villages had been considered and from each selected villages ten samples had randomly selected. Thus, total sample size was 240. With respect to overall adoption level of water management practices,exactly 40.0 per cent of the farmers had belonged to medium category of adoption. Whereas, 34.58 and remaining 25.42 per cent belonged to high and low adoption categories, respectively. Conservation as well as utilization of water is inevitable for effective water management.

Key words: Water management, Irrigation, Command Area, Adoption and CADA (Command Area Development Authority)

INTRODUCTION

The biosphere of the earth is home to ecosystems that give a wealth ofproducts and servicesto humanity. Human being utilizes the natural resources for his well-being.Gandhi (1909) in his book 'Hind Swaraj', explained the importance of natural resources which passed down from our forefathers and cautioned the mankind over dangerous lingering due to unrestricted materialism and consumerism. And, he accepted the complete ownership and rights on usage of properties has passes down from our forefathers but had responsibility to preserve the environment and handover to them at least as it was handed to us. Among the natural resources, water occupied three-fourth part of the earth's surface. Rivers and canals covers the length of India, totalling 1.9 lakh kilometres, and water bodies other than rivers and canals cover an area of around 7.31 million hectares. According to the Falkenmark's water stress indicator, a water-stressed situation means a per

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capita availability is less than 1700 m^3, and water shortage condition means per capita availability of less than 1000 m^3. In India water scarcity if major problem in present scenario and the gap between water demand and water supply is gradually widened highlighting the need to manage water resources (Anon, 2018). As a result, UKP was established across the Krishna River in the drought-prone northern Karnataka districts of Vijayapura, Belgaum, Bagalkot, Kalaburgiand Raichur.Water Management is important since it helps determine future irrigation expectations. Hence, this study was conducted to understand the water management in command area.

METHODOLOGY

During 2019-20 this study had carried out UKP command area. In this particular study the Ex-post-facto-research design had applied. The study was done in Vijayapura, Yadgir and Raichur districts of UKP Command Area. Purposive sampling technique had used to select two taluks from each selected district. Sindagi and Indi has selected from Vijayapura district, Surpur and Shahapur from Yadgir district and Deodurga and Lingasugur from Raichur district, respectively. In selection of villages, same criteria of highest area under irrigation by UKP project was followed in consultation with officials of Command Area Development Authority. From each selected taluka four villages were selected. Hence, finally selected 24 villages from six taluks.From each selected village, the farmers who are beneficiary of UKP project were considered as sample for the study. Ten sample farmers had selected on random basis from each of the selected villages. Thus, total sample size was 240.

According to Rogers (1962) adoption is a decision to continue full use of an innovation. Dasgupta (1989) defined it as the integration of an innovation into a farmer's normal farming activity over an extended period of time.

Sl. No.	Adoption pattern	Score
1	Full adoption	2
2	Partial adoption	1
3	Non-adoption	0

Sl. No.	Categories	Scores
1	Low	Less than (Mean - 0.425 SD)
2	Medium	Between (Mean ± 0.425 SD)
3	High	More than (Mean + 0.425 SD)

Adoption had analysed with the following procedure.

A list of adoption items of water managementpractices were prepared after discussing with experts from Agronomy, Soil Science and Agricultural Chemistry, Agricultural Economics, Agricultural Engineering and Agricultural Extension by referring various research articles, Books and UKP reports.

The scoring pattern had enlisted below

Enlisted 29water management practices in schedule. The total score had calculated by assigning above scores and here maximum score is 58 and zero was the minimum score.After that the farmers had differentiated by following criteria.

RESULT AND DISCUSSION

Adoption of water management practices by the farmers in command area

Overall adoption of selected water management practices by the farmers in command area

The overall adoption of selected water management practices by the farmers in command area is depicted in Table 1 indicates that, two fifth (40.00 %) ofrespondents belonged to medium category remaining 34.58 per cent and 25.42 per cent belonged to high and low adoption categories, respectively. Farmer's overall adoption of water management practices was medium to high level. Water is the main and critical input for farming activities. The occurrence of rainfall is unpredictable, from last few years' water scarcity is very severe, therefore they were managing water in a proper manner by various water management practices. The result is supported by the results of Akshaya and Kishan (2013).

Practices wise adoption of selected water management practices by the farmers in command area

Adoption of selected water management practices pertaining to maintenance of channels and distributaries

It is evident from the data in Table 2 depicts adoption of individual practices of maintenance of channels and distributaries.

In case of regular cleaning of Field Irrigation Channels (FICs), majority (91.25 %) had fully adopted. 39.58 per cent farmers partially adopted lining the Field Irrigation Channels (FICs) with impervious materials, little over one third (39.58 %) were fully adopted the practice.For maintenance of distributaries and channels 55.42 per cent farmers had fully participated. While, 37.08 per cent of the respondents were partially participated.27.50 per cent of the farmers were fully participated in field channel outlet constructed above the ground level. Whereas, 42.50 per cent of the respondents were partially participated. More than three fourth (77.50 %) of the farmers were fully adopteddesilting of channels, and 14.58 per cent of the respondents were partially adopted the practice.

The reason behind this trend might be that, the canal water flow by gravitational force, if there any interruption across the water movement results to overflowing of canal water and that will not reach the ultimate beneficiaries. Therefore, farmers in the command area were aware of this and they regularly clean the field irrigation channels. Most of the respondents have

knowledge about cement lining to the cracks of the channels, because they want that must carried out by the government. In command are if the farmers were worked through participatory mode leads to the effective utilization of available water to all the farmers. Most of the time many farmers will not participate regularly in maintenance work of channels and distributaries, due to the lack of co-operation among the farmers. While planning the channels construction the engineers allows the farmers to participate in planning work but most of the respondents were not participated because they might have thought that, those works were not related to them. The farmers were regularly cleaning the field irrigation channels against silts because the silt can prevent the water movement.

Adoption of selected water management practices pertaining to methods of irrigation

The view on Table 2 indicates that, adoption of individual practices about methods of irrigation.

Nearly two third (62.92 %) of the respondents were fully adopted the providing irrigation at morning or evening time. 37.08 per cent of the respondents were partially adopted the practice.With respect to practicing alternate furrow irrigation, 29.17 per cent of the respondents were fully adopted this practice.Cent per cent of the respondents were fully adopted warabandi system of irrigation. According to micro-irrigation technologies, 12.91 per cent of the respondents were fully adopted the practice.Majority (93.75 %) of the respondents were fully adopted ridge and furrow irrigation method. In case of practicing flood method of irrigation, 36.25 per cent of the respondents were fully adopted the practice.More than four fifth (81.67 %) of the respondents were fully adopted providing irrigation at critical stages of the crops. Whereas, 19.17 per cent of the farmers were partially adopted the practice.

The fact for the result might be due to that, farmers had knowledge about time of application of water to the field. During afternoon time, due to high temperature the applied water will gets evaporated. The availability of water is more in command area, the farmers were irrigating the crops more than their requirement. Therefore, most of the farmers will not practice the alternate furrow method of irrigation. The farmers in the command area, they receive the water in warabandi method, inevitably they must adopt this practice for equitable distribution of water to all the farmers. As the farmers were getting ample of water for irrigation, there many were not adopted micro-irrigation techniques. Majority of the farmers were growing the pulses, cotton and sugarcane crops they were practicing the ridge and furrow method of irrigation. Some of the farmers were growing paddy crops, as it needs the standing water. Hence, the farmers were adopted the flooding method of irrigation.

Adoption of selected water management practices pertaining to water saving techniques

It is evident from the data in Table 2 depicts adoption of selected water management practices pertaining to water saving techniques.

Nearly two fifth (21.25 %) of the farmers were fully adopted the mulching practice. With respect to conservation tillage, 19.58 per cent of the farmers were fully adopted the practice.In case of growing of different rooted crops, 15.83

per cent of the farmers were fully adopted.Nearly two third (64.17 %) of the farmers were fully adopted the levelling of undulated land and non-uniform land. More than three fourth (78.33 %) of the farmers were fully adopted planned scheduling of irrigation. While, 21.67 per cent of the farmers were partially adopted the practice. With respect to applying compost and FYM, 30.83 per cent of the farmers were fully adopted the practice.

The probable reason might be that, the farmers those who were growing chilli crop were followed the mulching practice, as the chilli is the cash crop the farmers were invest much cost in chilli production. The conservation and zero tillage was adopted by the very few farmers. Farmers were responded that, due to conservation tillage there were more weed, pest and disease infestation to the succeeding crops. They responded that, keeping the field very clean results to good crop growth and can assure the yield of the crops. Farmers not practicing different rooted crops for judicious utilization of soil moisture. But, most of the farmers were not following this because the farmers have some planned crops for every season, they grow those crops.

Source of irrigation in command area is canal and the water flow by gravitational force. Farmers in the command are were growing the paddy crop, for regular stagnation of water in the paddy field it's inevitably the land should be levelled.With the vast experience of the farmers, they had much knowledge about the water requirement to crops, hence farmers were practicing proper planned scheduling of irrigation. Farmers were rearing very less number of livestock, the advanced mechanization in agriculture the farmers were least dependent on the livestock animal's activity in agriculture, for this don't have FYM and compost and they may apply to the field but not regularly. Even farmers the farmers were using more of inorganic fertilizers, they were applying very minimal amount of FYM or compost.

Adoption of selected water management practices pertaining to selection of crops and its cultivation practices

The data presented in Table 2 indicates that, adoption of selected water management practices pertaining to selection of crops and its cultivation practices.

In case of growing of short duration varieties or hybrids, 27.92 per cent of the farmers were fully adopted the practice.According to maintenance of wider spacing and optimum plant population, 32.50 per cent of the farmers were fully adopted the practice. Whereas, 67.50 per cent of the farmers partially adopted the practice.With respect to growing of drought tolerant varieties, 30.42 per cent of the farmers were fully adopted the practice.More than two fifth (43.33 %) of the farmers were fully adopted cultivation of less water consuming crops. While, 56.67 per cent of the farmers were partially adopted the practice.Regarding intercultural operations *viz.,* hoeing, harrowing *etc.,* 93.75 per cent of the farmers were fully adopted. Majority (96.25 %) of the farmers were fully adopted summer ploughing.

Farmers in the command area were can't predict whether water is available thought the season or not, because they were dependent on the canal water, if the water available in the reservoir they might receive the water otherwise

may not. Hence, they even can't anticipate which duration crops could grow. Farmers sow the seeds with seed cum fertilizer drills, almost there will be aureate adjustment of spacing will be there, but also many time extra seeds falls and even they cannot maintain the number of plants per unit area due to mechanization in practice and of large land holding of the farmers it's very difficult and costlier for thinning of extra plants. Therefore, few were adopted the spacing and plant population of the crops.

Water availability in command area depends on the rainfall, hence farmers were preferring drought tolerant and less water consuming crops. The farmers were regularly practice the intercultural operations, as these operations were reduces the weeds problems closes the cracks which leads to reduction in evaporation loss. Hence, farmers practice the intercultural operations. The summer ploughing facilitates the turning of soil profile results to proper aeration in the soil.

Adoption of selected water management practices pertaining to excess water management techniques

It is evident from the data in Table 2 depicts adoption of selected water management practices pertaining to excess water management techniques.

According to construction of field drainage, 74.17 per cent of the farmers were fully adopted the practice.In case of Broad Bed Furrow (BBF) method of growing crops, 8.75 per cent of the farmers were fully adopted the practice.With respect to storage of excess water in farm pond or dugout structure, 17.08 per cent of the farmers were fully adopted the practice.Nearly three fourth (74.17 %) of the farmers were fully adopted the regular cleaning of the drainage system.Cent per cent of the farmers were fully adopted the field bunding to conserve soil and excess water.

The probable reason might be that, in command area the farmers cannot predict the irrigation water because it depends on the rainfall, sometimes receive higher water than required and sometime less. If the farmer received higher water results to waterlogging and salinity of the soil, to overcome this problem farmers were adopted the drainage system. In

Table 1. Distribution of farmers based on their overall adoption of selected water management practices in command area **n=240**

Sl. No.	Categories	Range	F	%
1	Low (Mean-0.425*SD)	<25.45	61	25.42
2	Medium (Between mean ± 0.425*SD)	25.46-30.41	96	40.00
3	High (Mean+0.425*SD)	>30.43	83	34.58
		Mean=27.94		SD=5.86

F-Frequency, **%**- Percent

Table 2. Distribution of the farmers based on adoption of selected water management practices in command area

n=240

Sl. No.	Water management practices	Fully Adopted		Partially adopted		Not Adopted	
		F	%	F	%	F	%
I.	**Maintenance of channels and distributaries**						
1	Regular cleaning Field Irrigation Channels (FICs)	219	91.25	21	8.75	0	0.00
2	Lining the Field Irrigation Channels (FICs) with impervious materials	95	39.58	0	0.00	145	60.42
3	Regular participation in maintenance of channels and distributaries	133	55.42	89	37.08	18	7.50
4	Channel outlet construction above the ground for easy movement of water to the farmer's field	66	27.50	102	42.50	72	30.00
5	Regular desilting the channels	186	77.50	35	14.58	19	7.92
II.	**Methods of irrigation**						
6	Irrigating at morning or evening time reduces evaporation loss	151	62.92	89	37.08	0	0.00
7	Practicing alternate furrow irrigation	70	29.17	0	0.00	170	70.83
8	Following warabandi system of irrigation	240	100.00	0	0.00	0	0.00
9	Micro-irrigation technologies	31	12.91	0	0.00	209	87.09
10	Practicing ridge and furrow irrigation method	225	93.75	0	0.00	15	6.25
11	Practicing flood method of irrigation	87	36.25	0	0.00	153	63.75
12	Providing irrigation at critical stages of the crops	196	81.67	46	19.17	0	0.00
III.	**Water saving techniques**						
13	Mulching the soil	51	21.25	0	0.00	189	78.75
14	Conservation tillage	47	19.58	0	0.00	193	80.42
15	Growing of different rooted crops	38	15.83	0	0.00	202	84.17
16	Levelling of undulated land and non-uniform land	154	64.17	0	0.00	86	35.83

17	Planned scheduling of irrigation	188	78.33	52	21.67	0	0.00
18	Applying FYM and compost can increase water holding capacity of the soil	74	30.83	0	0.00	166	69.17
IV.	**Selection of crops and its cultivation practices**						
19	Growing of short duration varieties or hybrids	67	27.92	0	0.00	173	72.08
20	Maintenance of wider spacing and optimum plant population	78	32.50	162	67.50	0	0.00
21	Growing of drought tolerant varieties	73	30.42	0	0.00	167	69.58
22	Cultivation of less water consuming crops	104	43.33	136	56.67	0	0.00
23	Intercultural operations *viz.*, hoeing, harrowing *etc.*,	225	93.75	0	0.00	15	6.25
24	Summer ploughing	231	96.25	0	0.00	9	3.75
V.	**Excess water management techniques**						
25	Construct the field drainage to drain	178	74.17	0	0.00	62	25.83
26	Broad Bed Furrow (BBF) method of growing crops	21	8.75	0	0.00	219	91.25
27	Storage of excess water in farm pond or dugout structure	41	17.08	0	0.00	199	82.92
28	Regular cleaning of the drainage system	178	74.17	62	25.83	0	0.00
29	Bunding to conserve soil and excess water	240	100.00	0	0.00	0	0.00

F-Frequency, **%-** Percent

study area, major crops were paddy, cotton, chilli and red gram, in these crops the broad bed furrow is not a proper method of growing. Hence, very few were adopted. The farmers may receive higher water in some situation, so the excess water has to fill in the dugouts or in farm ponds. Hence, few of the farmers had constructed the farm pond to store excess water. Regular cleaning the drainage system facilitates the easy flow of excess water and could reduce water logging. At the borders of the field the farmers were constructed the bunds to conserve the water and soil. As it saves the water and soil.

CONCLUSION

Water is a basic input for agriculture, due to changes in climate and global warming the variation in temptation, humidity and even rainfall is deviating from normal trend. In northern Karnataka region, most of the districts were dry

areas and regularly face drought condition. Hence, water management is very important and most of the water management practices been practicing by the farming community.

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STUDY ON ADOPTION OF NUTRIENT MANAGEMENT PRACTICES AMONG RAGI (*ELEUSINECORACANA* L.)GROWERS IN KRISHNAGIRI DISTRICT OF TAMIL NADU

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ABSTRACT

Ragi (*Eleusine coracana* L.), often known as finger millet, is an important minor millet crop in India. Because of its drought tolerance and resistance to a variety of agro-climatic extremes, ragi is an important dry land crop in the country. But under such conditions it will give only minimum yield. With effective nutrient management the yield can be improved with the improved ragi varieties. As a result, in the Krishnagiri district of Tamil Nadu, a research was undertaken on the adoption of recommended nutrient management practices among Ragi growers. In the state, Krishnagiri has the highest acreage and production of ragi. The investigation was conducted in the blocks of Thally and Kelamangalam. The study included 120 ragi growers drawn from 10 villages in each of the two blocks using a proportionate random sampling technique. In terms of nutrient management practices, half of the ragi growers adopted them to a medium extent. Though the overall adoption was medium, majority of the Ragi growers adopted practices like FYM application in nursery and main field, application of DAP or complex fertilizers. The practices such as soil testing, application of micronutrient mixture and bio-fertilizers were poorly adopted. To improve the adoption level the ragi growers has to be sensitized on the importance of nutrient management in the production of ragi through awareness campaign and training programmes. To improve the adoption of soil testing it should be made mandatory for the farmers to purchase fertilizers only based on the soil test report. So that the farmers can opt for soil testing and can be better in nutrient management through soil test based recommendation. It will ensure the improvement in soil fertility as well as avoid excess application of chemical fertilizers in the soil.

Key words: Finger millet, Nutrient management, Adoption, Soil testing, NPK, FYM.

INTRODUCTION

Ragi (*Eleusine coracana* L.) is an important minor millet crop in India that boasts the highest productivity of all millets. Ragi is cultivated on 1.208 million hectares in India, with a production of 2.06 million tonnes and productivity of 1706 kg/ha as an average(Agriculture Statistics at a Glance 2017).

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African millet and bird's foot millet are two other names for it. Ragi is a staple dish in India and Africa for millions of poor section of people. Ragi is the important minor millet in the country following sorghum and cumbu, in terms of both cultivated area and production. Karnataka, Tamil Nadu, Maharashtra, Andhra Pradesh, Jharkhand, Odisha and Uttaranchal are the primary Ragi growing states.

Ragi is a major dry land crop in the country, as it is largely cultivated by small farmers due to its flexibility and resilience to a variety of agro-climatic adversities, as well as its ability to thrive in soils with low water and nutrient supply and minimal external input supply. The crop produces low yields under these subsistence farming circumstances. The crop can withstand low rainfall and responds to increased rainfall, macronutrient application, and micronutrient application. Ragi crops have minimal nutritional requirements because they are frequently cultivated in dry terrain under subsistence farming circumstances, where only modest yields are achievable.

However, there are improved ragi varieties that respond better to additional nutrients. Nutrient management is one of the recommended management practices for boosting Ragi growth and yield. In order to fulfill possibly greater productivity goals established by farmers, under irrigated condition crop requires comparatively higher quantities of inorganic fertilizers under proper soil fertility conditions.

A long term fertilizer experiment conducted in TNAU has revealed that, application of 100% NPK along with FYM @ 10t/ha recorded significantly higher grain (2571 kg/ha) and straw yield of ragi out (Arulmozhiselvan *et al.,* 2013).However, there is a scarcity of information on ragi growers' utilization of nutrient management practices. With this in mind, a study on nutrient management practices adoption among Ragi growers in Krishnagiri district was undertaken with the goal of determining the extent to which recommended nutrient management practices were adopted by Ragi growers.

MATERIAL AND METHODS

The study was conducted using an ex-post facto research design. The research was carried out in Tamil Nadu's Krishnagiri district, which has the state's largest ragi cultivation area and highest production. Ragi is also grown in irrigated conditions in Krishnagiri, whereas it is rain fed in other areas of the state. Thally and Kelamangalam blocks were deliberately selected based on the highest area under ragi cultivation. Krishnagiri consists of 10 blocks, of which Thally and Kelamangalam blocks were purposively selected based on the highest area under ragi cultivation. A total of ten villages were selected at random from two blocks for the study. Using the proportionate random sampling technique, a sample of 120 ragi growers was chosen from the designated villages.

The adoption of suggested nutrient management practices was measured using a study-well developed schedule. The schedule was created after a thorough review of the literature and consultation with the University's soil scientists and extension professionals. The schedule consists of all the nutrient management practices recommended by Tamil Nadu Agricultural University. A score of two and one

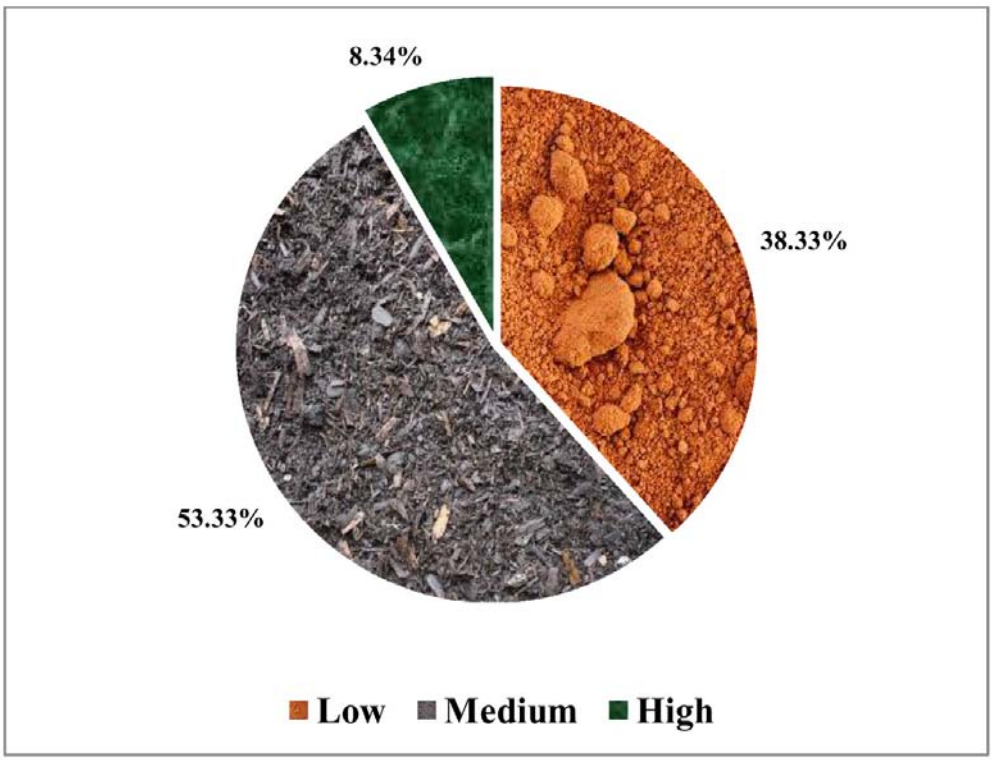

Figure 1. Overall adoption level of ragi growers on recommended nutrient management practices

were given to adopted and not adopted respectively.

Personal interview method was used to collect data from the selected ragi growers, with a very well structured and pre-tested interview schedule. Based on their adoption of recommended nutrient management practices in ragi cultivation, the data were tabulated, coded and analyzed using percentage analysis and cumulative square root of frequency to categorize the ragi growers into low, medium, and high. Individual practice-wise adoption were examined and presented in the paper using a percentage analysis.

RESULT AND DISCUSSION

Adoption of innovations by farming clients is the fruit aim of all the extension agencies. Rogers and Shoemakers (1971) defined adoption as a decision to make full use of new ideas as the best course of action available. The data collected to study the adoption behaviour of Ragi growers were given in Fig. 1.

According to the results furnished in Fig. 1, slightly more than half of the ragi growers (53.33 per cent) had medium level of adoption of recommended nutrient management practices, followed by 38.33 per cent who have a low level, and just 8.34 percent of ragi growers had a high level of adoption.

According to the findings, the overwhelming majority of the ragi growers (91.66%) were found to have a low to medium level of adoption of recommended nutrient management practices. It's possible that this is due to the fact that the most of the ragi growers were elderly and had low levels of education,

training, and use of information sources. Despite having agriculture as their primary occupation, the ragi growers' knowledge on recommended nutrient management was also attributed to be limited.

The low level of knowledge of ragi growers were observed in the recommended NPK, bio-fertilizer, and micronutrient doses, as well as soil testing procedures, was found to be lacking (Prasanth and Murugan, 2021a). As a result, ragi growers' adoption level of recommended nutrient management practices was found to be low to medium.

This finding is in agreement with the findings of Suresh (1991) and Shashank et al. (2016).

Practice-wise Adoption

The data on practice-wise adoption of recommended nutrient management practices were collected and the findings were furnished in Table 1.

Soil Testing

Table 1 shows that just 7.50% of ragi growers performed soil testing, but none of them followed soil test-based fertilizer recommendations. The low prevalence of soil testing is due to ragi growers' lack of knowledge and awareness of the benefits of soil testing. The ragi growers stated that they had no idea where the soil testing laboratory was located. Farmers claimed that even after a year, they had not received their soil test reports.

Despite the fact that some of them have adopted soil testing, they are unable to follow

Table 1.Distribution of the ragi growersbased on their practice wise adoption of nutrient management practices recommended forRagi cultivation (n=120)*

S. No	Practices	Number	Per cent
1.	Soil testing	9	7.50
2.	Soil test based fertilizer application	0	0.00
3.	Seed treatment with bio-fertilizers	0	0.00
4.	Nursery application of FYM or compost	87	72.50
5.	Cattle or Sheep penning	0	0.00
6.	FYM / Compost for main field	110	91.67
7.	Green manure / Green leaf manure	0	0.00
8.	Blanket recommendation of NPK (60:30:30 kg / ha)	0	0.00
9.	Top dressing (Remaining N fertilizer)	113	94.17
10.	Application of DAP / Complex fertilizers	110	91.67
11.	Application of micronutrient mixture	2	1.67
12.	Soil application of bio-fertilizers	5	4.17
13.	Seedling root dipping with bio-fertilizer	0	0.00

***- Multiple responses**

the recommended fertilizer dosages based on soil test report, because the report was given in the form of nutrients to be supplied to the field not in the form of fertilizer to be applied.

Organic Manure Application

The vast majority of ragi growers (91.67 per cent) adopted application of FYM/compost for main field, whereas 72.50 percent adopted application of FYM/compost for nursery. Because the majority of ragi growers had a high level of perception regarding the use of organic manure, and because most of the ragi growers were old and experienced, they had been following traditional practices for many years.

However, none of the ragi growers had adopted measures such as cattle/sheep penning and green manure crop application. Cattle and sheep populations have declined drastically over the years. This could be the cause for the lack of acceptance of cattle/sheep penning. Despite the fact that most farmers were aware of the benefits of green manure, they opted to use it solely for paddy cultivation.

Inorganic Fertilizers Application

In terms of fertilizer application, neither of the ragi growers had followed the university's blanket recommendation of NPK. This is mostly due to the fact that none of the ragi growers were aware of the blanket recommendation of NPK application. However, the vast majority of ragi growers (91.67%) used DAP/complex fertilizer's in their crops. The reason for this could be that farmers prefer to apply all necessary nutrients in a single pack because it is easier to do so in the field.

An overwhelming majority of ragi growers (94.17 per cent) used nitrogenous fertilizers as a top dressing. Because the majority of ragi growers use DAP/Mixed fertilizers and organic manures as the base application, NPK fertilizers have been found to be neglected.

Micronutrient Application

Micronutrient application is more crucial for enhancing ragi crop yield, even though only 1.67 percent of ragi growers have adopted the practice of micronutrient mixture application. Farmers were not ready to apply micronutrient mixture in their fields, despite the fact that the department of agriculture had made it mandatory through various schemes. Instead, they kept the packets at home or threw them away. The reason for this is that ragi growers are unaware of the importance of micronutrients in crop productivity.

Bio-fertilizer Application

In terms of bio-fertilizers, just 4.17 per cent of ragi growers used bio-fertilizers for soil application. Seed treatment with bio-fertilizers and seedling root dipping with bio-fertilizers were not being adopted by any of the ragi growers. The low adoption of bio-fertilizer could be related to the fact that none of the ragi growers were aware of the benefits of bio-fertilizer and how to use it in the field. Furthermore, because the most of ragi growers were elderly and illiterate, they were unwilling to adopt new practices.

CONCLUSION

The findings of the study clearly indicated that a great majority of ragi growers fall into the low to medium level category. And also, poor level of adoption was observed with practices such as, soil testing, application of micronutrient mixture, soil application of bio-fertilizers. soil test based fertilizer recommendations, seed treatment with bio-fertilizers, cattle or sheep penning, green

manure / green leaf manure, basal application (60:30:30 kg NPK/ ha), seedling root dipping with bio-fertilizer.The main reasons for poor adoption of the above mentioned nutrient management practices were a lack of awareness about soil testing, difficulty in soil sample collection, difficulty in understanding the soil test based recommendations, bulkiness of organic input, lack of information knowledge about recommended NPK dosage, lack of awareness about micronutrients, high labour cost, and unavailability of labour during peak season (Prasanth and Murugan, 2021b)

The first and foremost objective of the extension workers is to provide high level of knowledge among the farmers on the recommended technologies through appropriate extension activities so that the adoption of improved and modern practices can be improved. Therefore, the extension personnel should take adequate measures to enrich the knowledge level of the ragi growers so that they can influence the farmers for adopting the recommended nutrient management practices.

To achieve this, the agriculture department has to implement suitable extension strategies such as awareness campaigns, conducting result and method demonstrations,field tours to successful farmer's fields, periodic training programmes and providing appropriate study material in local language could help to improve their attitude and knowledge on nutrient management practices.

To improve the adoption of soil testing it should be made mandatory for the farmers to purchase fertilizers only based on the soil test report. So that the farmers can opt for soil testing and can be better in nutrient management through soil test based recommendation. It will ensure the improvement in soil fertility as well as avoid excess application of chemical fertilizers in the soil. By implementing these recommended strategies the adoption of recommended nutrient management practices among ragigrowers can be improved.

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PROBLEMS IN PRODUCTION AND PROCESSING OF COFFEE IN VISAKHAPATNAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

Coffee is one of the important plantation crop grown in India.Coffee cultivation suitable on slope lands in hilly tracts under shade conditions and also ensured good relationship with land and forest coverage. Coffee cultivation helps to tribal growers for sustainable income.The data was collected from a sample of 90 tribal coffee cultivars by interview and recall memory. The results showed thatirrigation was the major problem hindering the coffee production,lack of adequate knowledge on processing and lack of skilled labour. Problem hindering the coffee processing was lack of water source, lack of adequate drying beds and poor drying due to less lighting hours.

Key words: problems, production, processing and Garret ranking

INTRODUCTION

Coffee is one of the world's favorite beverage and second position in most traded commodity after oil on international trade exchanges both in terms of volume and value representing a significant source of income to several developing countries in Africa, Asia and Latin America. It is estimated that more than 20 million people throughout the world earn their living from coffee. Majority of them are involved in its production and 40 per cent of them consume coffee on a regular basis. Thus, coffee is extremely important in the economies of many countries and in world trade in general.India ranks eighth position with a total production of 3, 12,000 tonnes during 2018-19. India records about 4.5 per cent of world's coffee production and more than 95 per cent of productionwas shade grown under a multi layered canopy of forest trees and multiple crops. Rural poverty is gradually addressed by the sustainable income from the coffee production and selling.Farmers are now improving their capability of investment on education, better health care and are saving on group basis. The saving in the group could be used as sources of credit for meeting their immediate financial needs and also to invest on income generation venture.

MATERIAL AND METHODS

Paderu division was purposively selected as coffee is extensively cultivated in this division. This division occupies first place both in area and production in Visakhapatnam district.Six

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mandals namely G k Veedhi, Chintapalli, G.Madugula, Paderu, Hukumpeta, Dumriguda were purposively selected as they occupy the first six positions in area under coffee.Three villages from each mandal were selected based on highest area under coffee plantation. The coffee growing tribal farmers of the selected villages were listed in each village along with their operational holding and arranged in descending order and five coffee growing tribal farmers were randomly selected to make a sample of 90 respondents for the study. To capture comprehensively the constraints faced by coffee farmers in production and processing, Garret's ranking technique was applied. The present study relates agricultural year 2016-17.

Garrett's formula for converting ranks into per cent was given by

$$\text{Percentage Position} = \frac{100\left[R_{ij} - 0.5\right]}{N_j}$$

R_{ij} = Rank given for i^{th} phenomenon by j^{th} individual.

N_j = Number of items ranked by j^{th} individual.

RESULTS AND DISCUSSION

Production and Processing problems Coffee

The constraints faced by farmers in production and processing of coffee cultivation have been ranked by using Garrett's ranking technique and the analytical findings are presented in tables 1 and 2.

Table 2 reported that lack of irrigation facility was the major problem hindering the coffee production. Coffee is a water sensitive crop. In the present study coffee is mainly grown under rainfed crop. Lack of irrigation facility farmers get low yields compared to other coffee producing areas. Other production constraints

Table 1. Problems faced by farmers in production of coffee in Visakhapatnam district

S. No.	Production problems	Total score	Mean score	Rank
1	Irrigation facilities	580.00	6.44	I
2	Lack of knowledge	521.11	5.79	II
3	Lack of skilled labor	473.33	5.26	III
4	Poor soil fertility	444.44	4.94	IV
5	Credit facilities	400.00	4.44	V
6	Lack of crop insurance	227.78	2.53	VI
7	Damage by pest and diseases	77.78	0.86	VII

Table 2. Problems faced by farmers in processing of coffee in Visakhapatnam district

S. No.	Processing problems	Total score	Mean score	Rank
1	Water source	578.88	6.432	I
2	Shortage of central washing stations	393.33	4.370	II
3	Lack of technical know-how	298.88	3.320	III
4	Low price of processed coffee	254.44	2.827	IV
5	High costs & lack of materials for drying yards	153.33	1.703	V
6	Poor drying due to less light hours	133.33	1.481	VI

were lack of adequate knowledge on coffee production, lack of skilled labour, poor soil fertility, lack of credit facility, lack of crop insurance and damage by pest and diseases.

It can be observed from table 2 that the major problem hindering the coffee processing was lack of water source. Due to unavailable of much water source, farmers were going for sundry processing method. Sundry processed coffee feting lower price over parchment coffee, if water sources along with processing infrastructure may allow farmers adapt to parchment coffee processing method.Other processing problems were lack of washing stations, lack of technical knowledge, low price of processed coffee, lack of adequate drying beds and poor drying due to less lighting hours.

CONCLUSIONS

Coffee production is a vital business and wealth creation opportunity that contributes to poverty reduction in the main coffee producing areas. It can be understood that the tribal coffee farmers are facing many production and processing problems. The following recommendations are made to minimize the crisis situation and to maintain a sustainable profit in coffee production.

- Educating the farmers by the coffee board on water harvesting and sustainable means of irrigation would lead to efficient results.
- An urgent need to move towards cost effective and crop specific mechanization is essential, educating the farmers on advantages of mechanization and its uses should be treated as part of extension services by coffee board.
- The subsidies if provided on acreage basis, farmers avail sufficient crop specific subsidies for cultivation.
- Efforts have to be made to differentiate coffee processed on the basis of quality to enable farmers producing high quality coffee to earn a premium.

- Linkage with the coffee liquoring unit for sampling and quality evaluation and to encourage farmers to store coffee up to the point where they know the value before selling.

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RBK- ONE STOP SOLUTION AT FARMERS DOORSTEP IN ANDHRA PRADESH

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ABSTRACT

The government of Andhra Pradesh has launched Rythu Bharosa Kendra (Farmer Assurance Centers) on October 15th, 2019[1]. RBKs were set up to support farmers in all activities ranging from sowing seeds to selling produce. The centers will offer services like delivery of inputs to farmers ordering through kiosks, custom hiring of machinery, technical advisories and is an attempt to bring the agriculture extension system more closely to the farmers. The government has launched this scheme to bring more transparency and ensure the quality of services to the farming community

INTRODUCTION

Andhra Pradesh is primarily an agrarian state wherein 62% of its population are directly/ indirectly engaged in agriculture and allied activities.The government has established Dr. YSR Rythu Bharosa Kendras (RBKs) in 10,641 village secretariats during rabi 2019. To provide one stop solution for farmers i.e. from making available pre-certified quality inputs to farm advisories and a plethora of other servicesProviding remunerative prices for the produce of farmers is one of the important services that also been channelized through the RBKs.

RBKs were conceptualized based on the recommendations of the Swamiynathan Commission. The primary function of RBKs is to agriculture and allied services to the farmers. RBK will help the farmers make an informed decision as to which crops to be cultivated, to what extent, and how to maximize yield at low cost, by providing expert advice, market dynamics and also train them in new techniques and methods.

Andhra Pradesh government launched Rythu Bharosa Kendralu (RBKs) as a one-stop-shop to address all the needs of farmers across the state. Supply of quality inputs and dissemination of technical knowledge to the farmers are the primary objectives of RBKs. Agriculture department is the nodal agency for RBKs.

YSR RYTHU BHAROSA SCHEME:

Also with the PM kisan the government, under YSR Rythu Bharosa (assurance to farmer) scheme provides financial assistance of Rs13, 500 per annum to each of 56 lakh farmers' families and landless tenant farmer from Rabi,

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2019-20 in the statealong with the PM Kisan Scheme.

The above-mentioned financial assistance is extended to all the farmers irrespective of the land holding size and ownership in three installments[4]. YSR Rythu Bharosa Scheme registered farmers get an amount Rs 7500 per annum in two disposals 5500, 2000, and through PM Kisan farmer receiving the benefit of 6000 per annum in three installments of 2000. (i.e May 7500, October 4000 and January 2000)

E-Crop Booking

In e-crop booking list of crops cultivated by the farmers in the field, area under crop, crop variety registered in online. E-Crop booking is linked for other schemes like crop insurance and crop procurement registration for notified crops. It will be used to estimate the area, production, and other particulars of the state.

Crop insurance

Dr. YSR Free Crop Insurance Scheme is to provide Crop Insurance to all the cultivators/ farmers in the State, crop insurance be given for notified crops in the notified area to all the cultivators/farmers across the state

Through RBK, crop insurance registration is done at the village level at free of cost, in which the farmer's share of crop insurance premium was paid by the state government. To register crop insurance E-Crop booking was compulsory.

Crops covered under crop insurance were Paddy, Jowar, Bajra, Maize, Blackgram, Greengram, Redgram, Soybean, Groundnut (I), Groundnut (UI) Sunflower, Castor, Sugarcane (Plant), Sugarcane (Ratoon), Cotton,Chillies, , Turmeric, and Korra.

Apart from crop insurance, crop-cutting experiment for yield evaluation, ex-post damage evaluation was done with the assistance of RBK staff on the village level.

Procurement registration

If farmers want to sell their produce to government purchasing agencies, they need to register for crop procurement registration, for that E-Crop booking was compulsory. Farmers can directly book the procurement registration at RBK, Based on the registration details, farmers sell their farm produce in Government purchasing centers at MSP. Procurement is done at the farm gate level by the procurement Agencies with advance intimation to the concerned farmers[2]

A.P.Markfedis notified as state nodal agency for procurement of coarse grains and pulses at MSP as per the instructions of the state government. During kharif marketing season 2020-21, for procurement of kharif coarse grains at MSP and rabi coarse grains to be procured[3]

Dr. YSR RBKs as procurement centres for all the agricultural and Horticulture cropscommodities to ensure remunerative prices to farmers. Department of civil supplies (AP Civil Supplies Corporation), Markfed, Oilfed, and CCI will accordingly coordinate with the department of agriculture to ensure the procurement operations for of the farmers.

Agri input shop

From RBK, farmers avail the good quality and certified inputs like seeds, fertilizers, micronutrients, pesticides, bio-fertilizers, implements, feed additives for fish and livestock, etc.,

The farmer needs to place the order through a digital kiosk machine, and then the needed input was delivered to farmers at his village. In initial period order, placement and delivery of inputs to farmers within take 24-48 hours. After of ordering through kiosks, the order will reach hub then order inputs will deliver to the respected village, but now it the RBK are ensuring with the ready availability of needed inputs in RBK itself.

Custom Hiring Centers

A group of 4-5 farmers voluntarily joins and forms Custom Hiring Centers (CHC) in each RBK at village level to increase farm mechanization. The group can purchase farm machinery up to Rs. 15 lakhs.In that farmers could avail 40% subsidyfrom government, 50 % from bank loan for the group, 10 % will be the farmer's contribution. The CHC group operates in the village and repays the loan amount to the bank.

Soil Testing and Moisture testing

Each RBK has a soil-testing kit, using which farmers can assess their soil fertility;Farmers utilize the service of RBKs soil testing facility for the optimal application of recommended fertilizers to their field. Previously soil testing was available only at Mandal level,and using Moisture testing facility farmers may know the moisture content of final product and plan the marketing activity

Village Advisory Board

At each village level, one village advisory board will be formed to address the farmer's issue, discuss the good practices and advanced technologies. Farmers feel more empowered than before as previously existed district-level farm advisory boards do not have much representation.

Polambadi : Village Field school

Farm Field Schools at the village level consists of 30 farmers for creating knowledge about good agricultural practices.In both season14 weekly field school/class was conduct by RBK staff, to enhance the farmer's knowledge on particular crop.

Crop Cultivator Rights Cards (CCRC)

Active farmers who do not have land titles are benefited from the CCRC scheme, also known as Swayam Sahayaka Sagudharula Sangam(SSSS).Tenant farmers can avail crop loans from commercial banks and other benefits from other related institutions.

Animal Health checkup and control

Once in a Week village animal husbandry assistance visit RBK and offer the animal health checkup.

Milk Collection/ procurement Center

The new initiation of milk collection at each RBK started in few-selected Mandals. The price received by the farmer from these collection centers is more than the existing collection system.

Knowledge spread to farmers

To increase the knowledge of farmers RBK system have a function of Technology Dissemination WhatsApp advisory, RBK Farm Magazines and YouTube channel, Village level volunteers, Price and weather forecast information.

Village level volunteers act as the bridge between RBK staff and farmers at the field level.

Any information dissimilation and group gathering the volunteers help the RBK staff.

To enrich farmers' knowledge each RBK is equipped with a farmers' library and magazine subscription facility. Apart from four dedicated WhatsApp numbers, is available for farmers to rise farm-related issue that can be answered by higher-level officials and scientists.

The RBKs were also provided with smart TVs to share technical information on agriculture andallied sectors with farmers. The government has established RBK channel to telecast need-based technical content through these smart TVs. The RBK channel will act as a one stopplatform for farmers to find required solutions.

In each RBK the forecasted weather information for the region and forecasted price for agricultural commodities will be available in the notice board.

Service Now offered at RBK Before RBK

RBK Scheme Registration Through which farmers get financial assistance of Rs.13500/ annum. Before RBK there was no financial assistance Scheme for farmers.

E-Crop Booking E-Crop Booking done by RBK staff at village levelFor Each RBK- 2000 farmers. E-Crop booking was done by Mandal Office Multi-Purpose Extension Officers (MPEO) Area of operation for individual staff was very high

Crop insurance Farmers will get free Crop insurance for notified crops in RBK at their village.Farmers Premium fully paid by the state government Farmers need to visit Mandal level office/ E- Seva point for crop insuranceThe farmer needs to pay their full premium for the crops.

Procurement registration Procurement registration done by RBK and procurement done by PACS committee Procurement registration and procurement is done by the PACS committee A lot of trader's intervention in registration and collection.

Agro Input Shop Farmer can get needed input at their villageFarmers paying MRP The farmer needs to visit private retail agro shopsThe price paid by the farmers was highPrivate shops add more inputs to farmer's basket

Custom Hiring Centers In Each RBK one CHC offer farm mechanization The subsidy is given at Mandal level for selected farmers only

Soil Testing Test Kit available at each RBK in village level Mandal level soil testing labs.

Village Advisory Board Village level farm advisory board District level farm advisory boar.

Polambadi For each cropping season regular weekly schools at the village level Mandal level field schools for selected farmers

CCRC It is a new system in which tenant farmers get a certificate of crop cultivation to avail benefits No such system available to farmers

Animal Health checkup and control In each RBK weekly once veterinary assistant visits and do a health checkup Cluster level animal husbandry staff will be there, for seasonal wise disease checkup

Technology Dissemination YouTube Latest technologies and good agricultural practice technique video demonstration available in YouTube channel. Not available before.

RBK Farm MagazinesFarm library In RBK, farmer subscribe farm magazine at the cost of Rs.300/ yearFarm library is available in each RBK to enrich farmer's knowledge on agriculture. Farmer's library not available before

Village level volunteers For every 50 farmers one village level volunteer available Not such facility available

WhatsApp advisory Dedicated WhatsApp numbers give a solution for a farmers field problem Not such facility available

Milk Collection/ procurement Center RBK doing the function of milk procurement at more than market price from farmers.

Market News and information In every RBK, Weather and price forecast of agricultural commoditiesare displayed on the notice board For price forecast and market information farmer need to visit Mandal level agriculture office.

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ASSOCIATION AMONG THE PROFILE OF SERICULTURE BENEFICIARY FARMERS OF TECHNICAL SERVICE CENTRES (TSCS) AND THEIR ATTITUDE TOWARDS ACTIVITIES OF TECHNICAL SERVICE CENTRES IN KARNATAKA STATE

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ABSTRACT

The research study was conducted for the period of 2018-20 in the state of Karnataka, India. An *Ex-Post Facto* investigate design used for the study. The Ramanagara and Mandya districts chosen due to above districts have more of TSCs in Bangalore and Mysore administrative divisions, respectively. The selected taluks viz., K.R Pet, Malavalli, Mandya and from Mandya district meanwhile Kanakapura, Channapatna and Ramanagara taluks were chosen from Ramanagara district by using purposive sampling. The four TSCs from every taluk together twelve from each district, totally 24 TSCs chosen for the research study. There are 10 sericulture farmers under each TSC, together 240, were chosen by using simple random sampling method. An effort has been made to investigate if there exists any association of the profile of farmers such as , age of the farmer, education, farming experience, annual income, size of land holding, family status, cropping pattern, mass media utilization, social participation, information consultancy, credit acquisition and utilization, scientific orientation, management orientation, risk orientation and achievement motivation with their attitude towards activities of TSCs. It was analysed by using Karl Pearson correlation coefficient and multiple regression. The research study depicted that correlation coefficient (r) values of independent variable *viz.,* education, mass media utilization, information consultancy and scientific orientation were optimistically significant at 0.01 probability level. The variables like Experience in sericulture social participation and achievement motivation were optimistically significant at 0.05 probability level. The rest of independent variables like age, annual income, landholding, family status, cropping pattern, credit acquisition and utilization, management orientation, risk orientation were optimistically non significant association with their attitude towards TSC activities. The 'R^{2}' numeric of 0.673 inferred that whole 15 independent variables together projected about 67.30 percent deviation in the attitude of sericulture farmers. Rest of 32.70 per cent is caused by effect of extraneous variables. Therefore, it could be inferred that profile of sericulture farmers particular to a large extent explained the deviation in attitude of sericulture farmers on the way to activities of TSCs. The independent variables like education, information consultancy and achievement motivation have contributed to the variation in attitude of sericulture farmers.

Keywords: Association, Profiles, Attitude, Significant

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INTRODUCTION

Sericulture is an agricultural enterprise, work concentrated, send out situated business action. Sericulture which is recognised as an auxiliary occupation in the past is presently being considered as significant action and ranchers will take-up enormous scope sericulture. It gives an optimal vocation freedom to a large number of ladies without upsetting their family work. Silkworm rising can produce normal work for 12-13 people for every ha with low speculation and a short growth time of a half year.

In 2018-19, under worldwide situation, China is the main silk producer (1, 20,000 MT) trailed by India (35,461 MT), Uzbekistan (1,800 MT), Thailand (680 MT), Vietnam (680 MT), Brazil (650 MT), North Korea (350 MT) and Turkey (30 MT). The significant silk buyers of the world are United States of America (USA), Italy, Japan, India, France, China, United Kingdom, Switzerland, Germany, United Arab Emirates (UAE), Korea, Vietnam,etc. (International Sericultural Commission, 2020)

India is a one of a kind nation creating every one of the four known assortments of silk, to be specific, tamed Mulberry silk (Bombyx mori), semi-tamed Eri silk (Philosomia ricini), wild Tasar silk (Antheraea mylitta) and selective Muga silk (Antheraea assama), the wild Golden silk being novel to India. Sericulture is a work escalated industry in the entirety of its stages with business age of around 7.65 million people for each annum. Since Labor Force Participation Rate (LFPR) in sericulture is a long ways ahead in contrast with comparative provincial occupations, it has essentially added to destitution lightening in this manner accomplishing the public plan of comprehensive turn of events. The yearly crude silk creation arrived at a record high of 35,468 MT during 2018-19, of which, mulberry crude silk creation amassed to 25,345 MT (71.50 %) and the excess 10,124 MT (28.50 %) was Vanya silks. According to 2018-19, the Karnataka (11,592 MT) is driving maker of silk followed by Andhra Pradesh (7481 MT), Assam (5026 MT) West Bengal (2394 MT), Tamil Nadu (2032 MT) and Meghalaya (1187 MT). (Central Silk Board, 2018-19).

Sericulture is considered as primary business and pay creating action in Karnataka. The Technical Service Centers are assuming a mind blowing part of augmentation for prosperity of sericulture ranchers through their expansion exercises. Specialized Service Centers are the cutting edge units and they propel the ranchers to take up mulberry development and silkworm raising. The TSC is the particular augmentation framework set up at grass root level, which are effectively open to ranchers and assists with dispersing information and cause them to embrace the logical advances of mulberry development and silkworm raising. The expansion endeavors of TSCs are apparent for expanding creation, usefulness and nature of mulberry and cases. In this setting there is an important to concentrate on the connection among profile of recipient ranchers of TSCs and mentality. Every one of the discoveries of the review help to refinement and reconstruction of augmentation philosophies of TSCs. It likewise assists with knowing the viability of TSC expansion faculty by estimating information and reception of suggested advances of mulberry and silkworm raising among sericulture recipient ranchers. There is a degree for expansion framework to diffuse the sericulture advancements to the non-sericulture developing

regions and to become agribusiness as a productive area and the examination studies were generally not led on sericulture augmentation framework (Technical Service Centers).

MATERIAL AND METHODS

The research study was conducted for the period of 2018-20 in the state of Karnataka, India. An *Ex-Post Facto* investigate design used for the study. The Ramanagara and Mandya districts chosen due to above districts have more of TSCs in Bangalore and Mysore administrative divisions, respectively. The selected taluks viz., K.R Pet, Malavalli, Mandya and from Mandya district meanwhile Kanakapura, Channapatna and Ramanagara taluks were chosen from Ramanagara district by using purposive sampling. The four TSCs from every taluk together twelve from each district, totally 24 TSCs chosen for the research study. There are 10 sericulture farmers under each TSC, together 240, were chosen by using simple random sampling method. A well structured interview schedule was used for data collection. An effort made to investigate association of the profile of farmers such as , age, education, farming experience, annual income, size of land holding, family status, cropping pattern, mass media utilization, social participation, information consultancy, credit acquisition and utilization, scientific orientation, management orientation, achievement motivation and risk orientation with their attitude towards activities of TSCs. It analysed by by means of Karl Pearson correlation coefficient and multiple regression are given below.

CORRELATION CO-EFFICIENT (R)

In the study, correlation coefficient was included to detect the significance association, if, any among independent and dependent variables. The formula used is as follows

$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left(\sum x^2 - \frac{(\sum x)^2}{n}\right) \times \left(\sum y^2 - \frac{(\sum y)^2}{n}\right)}}$$

Where,

n = Sample size

$xy-(x)(y)/n$ = Sum of product of x and y

$x^2-(x)^2/n$ = Sum of square of x

$y^2-(y)^2 / n$ = Sum of square of y

The 't' test of significance was used to test the significance of the 'r' value, using the formula.

$$\text{Stn-2df} = \frac{r \times \sqrt{n-2}}{\sqrt{1-r^2}}$$

Where,

n= Sample size

r = Correlation co-efficient value

MULTIPLE REGRESSION ANALYSIS

Multiple regression method was used to discover out the function of various independent variables on dependent variable, regression analysis was analysed. In other words, the influence of a variety of independent variables on the dependent variable was obtained by regression analysis. The following is the formula of multiple regression equation

$$Y = a + b_1X_1 + b_2X_2 + \ldots + b_nX_n$$

Where,

Y = Dependent variable

a = Intercept

X_1 to X_n = Independent variables

b_1 to b_n = Partial regression co-efficient

RESULTS AND DISCUSSION

The results from table 1 and figure 1 reported that, correlation coefficient (r) values of independent variables like education, mass media utilization, information consultancy and scientific orientation were optimistically significant at 0.01 probability level. Hence, the null hypothesis was rejected by accepting empirical hypothesis for those variables. Whereas, experience in sericulture, annual income, achievement motivation and social participation were optimistically significant at 0.05 probability level. The rest of independent variables like age, size of landholdings, family status, cropping pattern, credit acquisition and utilization, achievement motivation and management orientation were optimistically non significant association with their attitude towards TSC activities.

Table 1. Association among profile of sericulture farmers with their attitude towards activities of TSCs

(n=240)

S. No.	Independent variable	Karl Pearson's 'r' value
1	Age	0.051 NS
2	Education	0.524**
3	Experience in Sericulture	0.253*
4	Annual Income	0.375*
5	Size of Landholding	0.143 NS
6	Family Status	0.087 NS
7	Cropping Pattern	0.065 NS
8	Mass Media Utilization	0.413**
9	Social Participation	0.368*
10	Information Consultancy	0.608**
11	Credit Acquisition and Utilization	0.185 NS
12	Scientific Orientation	0.494**
13	Management Orientation	0.093 NS
14	Risk Orientation	0.102 NS
15	Achievement Motivation	0.235*

* Significant at 0.0 5 probability level
** Significant at 0.01 probability level
NS=Non Significant

AGE VERSUS ATTITUDE

It is reported as of the Table 1. and Figure 1. Computed r-value (0.051) for age and attitude of sericulture farmers on the way to activities of TSCs. It depicted that, positive and non significant association among age and attitude of sericulture farmers on the way to activities of TSCs. Sericulture farmers were middle aged with an urge to benefit the subsidies, supporting price for cocoon, disinfectants, mulberry saplings etc and participated in extension s activities like trainings, demonstrations, study tours, etc. The old age sericulture farmers could not participated in TSCs extension activities due to their old age, less energy, less interest and unhealthy conditions. The above probable reason might results above trend.

EDUCATION VERSUS ATTITUDE

Table 1. and Figure 1. depicted that, computed r-value (0.524**) for education and attitude of sericulture farmers on the way to activities of TSCs. It found that there was positive and significant association among education and attitude of sericulture farmers on the way to activities of TSCs at 0.01 probability level. The possible reason due to fact that most of the sericulture farmers had high school to middle school education which leads to sericulture farmers had exposed mass media like news papers, television and mobile phone and it helped to improve information seeking behaviour about latest sericulture technologies and programmes implemented by TSCs. The above findings were in conformity with the findings of Gonshetwad *et al*.(2016) and Shireesha *et al*.(2016).

Experience in Sericulture versus Attitude

Table 1. and Figure 1. highlighted that, computed r-value (0.253*) for experience in sericulture and attitude of sericulture farmers on the way to activities of TSCs. It exposed that there was positive and significant association among experience in sericulture and attitude of sericulture farmers on the way to activities of TSCs at 0.05 probability level. The expected reason due to fact that, sericulture farmers had 20 years of experience in sericulture, it improves skill and proficiency in mulberry and cocoon production. They influenced from TSCs to take up sericulture as main occupation and benefitted extension services over the years of sericulture started. The above findings were in conformity with the findings of Shireesha *et al.* (2016) and Archana *et al.* (2017).

ANNUAL INCOME VERSUS ATTITUDE

A bird eye view of Table 1. and Figure 1. found that computed r-value (0.375*) for annual income and attitude of sericulture farmers in the direction of activities of TSCs. It depicted that there was positive and significant association among annual income and attitude of sericulture farmers on the way to activities of TSCs at 0.05 probability level. The feasible reason due to the fact that farmers chosen sericulture as main occupation who were influence from TSCs and sericulture was year around income generating activity along with animal husbandry. TSCs activities were indirectly influenced on annual income of sericulture farmers the probable reason for above trend. The above findings were in conformity with the findings of Kafura *et al.*(2016), Gonshetwad, *et al.*(2016).

SIZE OF LAND HOLDINGS VERSUS ATTITUDE

A cursory look from Table 1. and Figure 1. found that computed r-value (0.143) for size of land holdings and attitude of sericulture farmers on the way to activities of TSCs. It depicted that there was positive and non significant association among size of land holdings and attitude of sericulture farmers on the way to activities of TSCs. Size of land holdings was not influence to form attitude towards TSCs activities. The above findings were in conformity with the findings of Gonshetwad, *et al*.(2016) and Shireesha *et al*.(2016).

FAMILY STATUS VERSUS ATTITUDE

Table 1. and Figure 1. was also highlighted that computed r-value (0.087) for family status and attitude of sericulture farmers on the way to activities of TSCs. It reported that positive and non significant association among family status and attitude of sericulture farmers on the way to activities of TSCs. The above findings were in conformity with the findings of Shireesha *et al*.(2016).

CROPPING PATTERN VERSUS ATTITUDE

It was noticed from Table 1 and Figure 1. highlighted that computed r-value (0.065) for cropping pattern and attitude of sericulture farmers on the way to activities of TSCs. It depicted that positive and non significant association among cropping pattern and attitude of sericulture farmers on the way to activities of TSCs.

MASS MEDIA UTILIZATION VERSUS ATTITUDE

Table 1. and Figure 1. highlighted that computed r-value (0.413**) for mass media utilization and attitude of sericulture farmers on the way to activities of TSCs. It found that positive and significant association among mass media utilization and attitude of sericulture farmers on the way to activities of TSCs at 0.01 probability level. The mass media sources helped to acquired knowledge about scientific technologies recommended by research institutes. The TSC officials and Assistant Director of Sericulture act as a resource persons in Krishi Darshana programmes to create awareness about latest sericulture technologies. The sericulture farmers getting SMS services containing information on market price of nearby cocoon market to their mobile phone and also farmers make a call to reelers of cocoon market to get daily market information. The above findings were in conformity in the line of findings of Gonshetwad, *et al.*(2016) and and Archana *et al.* (2017).

SOCIAL PARTICIPATION VERSUS ATTITUDE

The results from Table 1. and Figure 1. found that computed r-value (0.368*) for social participation and attitude of sericulture farmers on the way to activities of TSCs. It depicted that positive and significant association social participation and attitude of sericulture farmers on the way to activities of TSCs at 0.05 probability level. The possible reason might b due to fact that, TSC officials were utilizing the social institution like PACS for creating awareness of scientific sericulture technologies and credit facilities among sericulture farmers. It helps to improve the attitude towards TSCs. The above findings were in conformity with the findings of Archana *et al.* (2017).

Information Consultancy Versus Attitude

Table 1. and Figure 1. found that computed r-value (0.608**) for information consultancy and attitude of sericulture farmers on the way to activities of TSCs. It revealed that positive and

significant association among information consultancy and attitude of sericulture farmers on the way to activities of TSCs at 0.01 probability level. The sericulture farmers were seeking more information on mulberry cultivation and silkworm rearing from TSCs, grainage centres and input dealers, which helps build positive response towards information sources and it also improves knowledge on scientific technologies.

CREDIT ACQUISITION AND UTILIZATION VERSUS ATTITUDE

A cursory look from Table 1. and Figure 1. depicted that computed r-value (0. 0.185) for credit acquisition and utilization and attitude of sericulture farmers on the way to activities of TSCs. It found that positive and non significant association among credit acquisition and utilization and attitude of sericulture farmers on the way to activities of TSCs. The expected reason due to fact that there is no association among TSCs and credit sources.

SCIENTIFIC ORIENTATION VERSUS ATTITUDE

Table 1. and Figure 1. depicted that computed r-value (0.494**) for scientific orientation and attitude of sericulture farmers on the way to activities of TSCs. It depicted that positive and significant association among scientific orientation and attitude of sericulture farmers on the way to activities of TSCs at 0.01 probability level. The probable reason might be due to fact that TSC officials were motivated among sericulture farmers from their extension activities and sericulture farmers had information seeking from TSC officials about latest sericulture technologies. The other probable reasons sericulture farmers had high to middle school education, medium mass media utilization and medium information consultancy.

MANAGEMENT ORIENTATION VERSUS ATTITUDE

The results from Table 1 and Figure 1. revealed that computed r-value (0.093) for management orientation and attitude of sericulture farmers on the way to activities of TSCs. It found that there was positive and non significant association among management orientation and attitude of sericulture farmers on the way to activities of TSCs.

RISK ORIENTATION VERSUS ATTITUDE

The research findings from Table 1. and Figure 1. found that computed r-value (0.102) for risk orientation and attitude of sericulture farmers on the way to activities of TSCs. It reported that there was positive and non significant association among risk orientation and attitude of sericulture farmers on the way to activities of TSCs. The mulberry cultivation and silkworm rearing are the associated with huge risk in maintaining micro climate and pest and disease management and risk taking capacity of farmers improve through his experience in sericulture The mulberry cultivation and silkworm rearing are the associated with huge risk in maintaining micro climate and pest and disease management. The farmers were capable of risk taking in successful cocoon production through his experience in sericulture, but TSC officials. The findings were in the line results of Thiyagarajan (2011).

ACHIEVEMENT MOTIVATION VERSUS ATTITUDE

The results from Table 1. and Figure 1 revealed that computed r-value (0.235**) for achievement motivation and attitude of

Dependent Variables

Y_1 : Sericulture farmers attitude towards TSC activities

Independent Variables

X_1 : Age

X_2 : Education

X_3 : Experience in Sericulture

X_4 : Annual Income

X_5 : Size of Land Holdings

X_6 : Family Status

X_7 : Cropping Pattern

X_8 : Mass Media Utilization

X_9 : Social Participation

X_{10} : Information Consultancy

X_{11} : Credit Acquisition and Utilization

X_{12} : Scientific Orientation

X_{13} : Management Orientation

X_{14} : Risk Orientation

X_{15} : Achievement Motivation

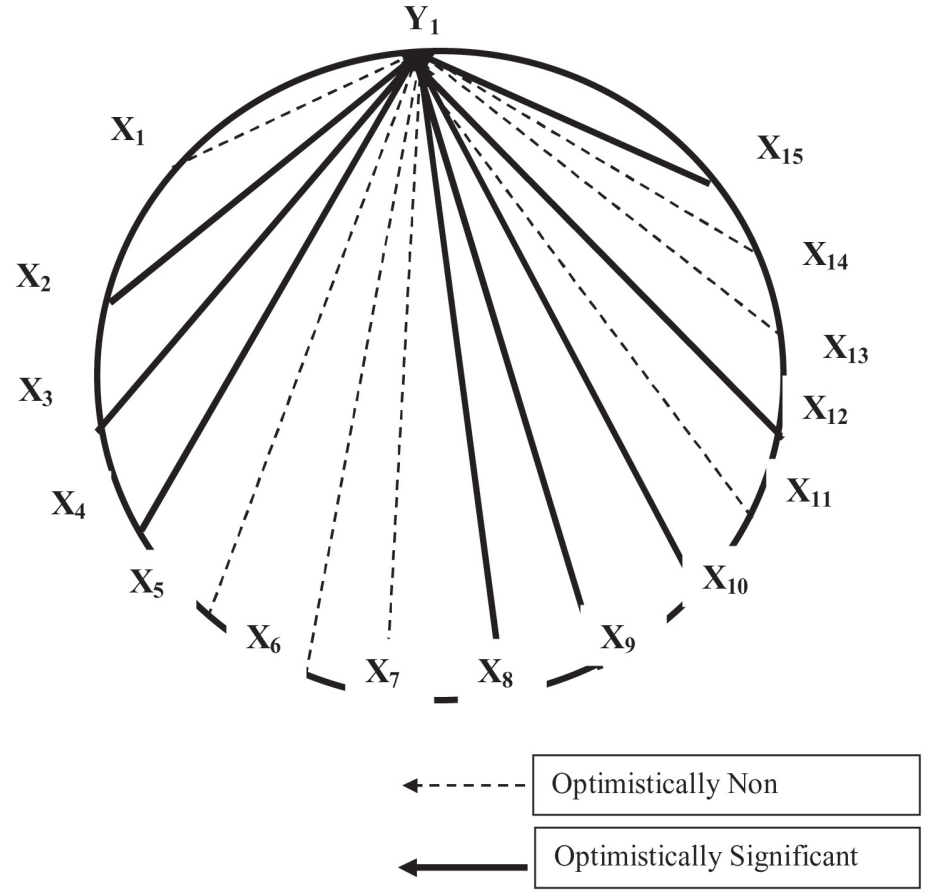

Figure 1. Association among profile of beneficiary farmers with their attitude towards activities of TSCs

Table.2 Multiple regression analysis among the profile of sericulture farmers and their attitude towards activities of TSCs

(n=240)

S. No.	Independent variable	Regression Coefficients	Standard Error	t-Values	P Values
1	Age	1.061	1.156	0.250^{NS}	0.334
2	Education	2.618	0.343	4.771**	0.002
3	Experience in Sericulture	0.034	0.128	0.282^{NS}	0.772
4	Annual Income	1.776	5.011	0.354^{NS}	0.724
5	Size of Landholding	2.698	0.327	2.151*	0.032
6	Family Status	0.149	0.321	0.434^{NS}	0.661
7	Cropping Pattern	0.025	0.123	1.857^{NS}	0.891
8	Mass Media Utilization	3.263	2.144	3.793*	0.003
9	Social Participation	0.367	0.301	0.212^{NS}	0.227
10	Information Consultancy	4.220	2.150	4.496**	0.001
11	Credit Acquisition and Utilization	0.086	0.186	0.481^{NS}	0.627
12	Scientific Orientation	1.532	0.227	2.342*	0.020
13	Management Orientation	0.054	0.134	0.431^{NS}	0.662
14	Risk Orientation	0.191	0.223	0.872^{NS}	0.380
15	Achievement Motivation	2.566	0.231	2.403**	0.001

* Significant at 0.0 5 probability level

** Significant at 0.01 probability level

NS= Non Significant

a =31.083 R^2 =0.673

sericulture farmers on the way to activities of TSCs. It found that there was positive and significant association among achievement motivation and attitude of sericulture farmers on the way to activities of TSCs at 0.05 probability level. The plausible reason due to the fact that sericulture was the year round income generating entrepreneurial activity and most of the farmers small holders might have consulted to TSC officials for adopting scientific sericulture technologies to improve farm income as well as to improve social status of family. At the same time, sericulture farmers had middle age group, medium and information consultancy and medium mass media utilization category. The above findings were in conformity with the findings of Samatha *et al.*(2014).

Multiple regression analysis was used to find out the extent of contribution made by the profile of sericulture farmers to elucidate deviations in the dependent variable such as ; attitude of sericulture farmers on the way to

activities of TSCs. The results are presented in Table 2.

A bird eye view from the Table 2 that Coefficient of Determination (R^2) value was significant. The 'R^2' value of 0.673 inferred that whole the 15 independent variables, explained about 67.30 per cent variation in the attitude of sericulture farmers. Rest 32.70 per cent is because of extraneous variables effect. Therefore it is revealed that profile of sericulture farmers selected to a great degree explained the variation in attitude of sericulture farmers on the way to activities of TSCs. The independent variables such as education, information consultancy and achievement motivation have contributed to the variation of attitude of sericulture farmers.

CONCLUSION

The independent variables like education, Mass media utilization, information consultancy and scientific orientation were optimistically significant at 0.01 probability level. Whereas, experience in sericulture, annual income, social participation and Achievement motivation were optimistically significant at 0.05 probability level. The rest of independent variables likeage, size of landholdings, family status, cropping pattern, credit acquisition and utilization, management orientation and risk orientation were optimistically non significant association with their attitude towards TSC activities Therefore, Karnataka State Department of Sericulture impart refresher trainings to Sericulture Extension Officer of TSCs and demonstrators to improve the efficacy of extension work. TSC official need to maintain transparency in selection of farmers to distribute extension services like subsidy amount, support price, consultancy services, power sprayers etc to all farmers without bias and it improves credibility and good rapport among farmers. However, sericulture farmers might have high positive attitude towards activities of TSCs due to extension efforts of TSCs.

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DETERMINANTS OF SUSTAINABLE ENTREPRENEURSHIP DEVELOPMENT IN COCONUT BASED ENTERPRISES

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ABSTRACT

The coconut based entrepreneurship based on value addition held great significance in the economy of Kerala. The entrepreneurs are keen in finding different ways to face the uncertain environment in these single crop based industries. The study was conducted in this backdrop to aid the entrepreneurs for achieving a steady nature for their enterprises. The study suggest a conceptual model for sustainable entrepreneurship development with four dimensions viz. technological capability, skill competencies of workers, scaling readiness and efficient forward and backward linkages. The relationship between these dimensions and related factors were also delineated in the study.

Key words: Sustainable entrepreneurship development, Technological capability, Scaling readiness

INTRODUCTION

Kerala tops in terms of annual production of coconut with 5,384 million nuts and cultivated in a total area of 760946.63 ha among other Indian states (APEDA, 2018). After globalization rapid transformations occurred in all sectors of economy. The resulted changes in the ways of marketing and technology use, skill enhancement and knowledge management also affected the coconut based entrepreneurship tremendously. Conventional entrepreneurship in coconut sector was focused mainly on profit maximization. But in order to sustain growth and development of enterprises in the sector, environmental and social components in the system should be given more importance. This has become the need of the hour for development of a crisis resilient entrepreneurial ecosystem based on coconut. The study aims to suggest a conceptual model indicating the determinants of sustainable coconut entrepreneurship development in the state of Kerala.

MATERIALS AND METHODS

The ex-post facto research design was followed in this study. Three districts viz. Thrissur, Kozhikode and Ernakulam which had the largest number of registered coconut processing enterprises were selected as the study area from the state of Kerala..The criteria followed in the selection of enterprises were minimum three

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years' experience in coconut entrepreneurship and market presence of the products. The total sample size of enterprises was fixed as 45 following the ratio of 20:10:15 in proportion to the number of registered coconut MSMEs in the selected districts of Thrissur, Ernakulam and Kozhikode respectively. Additional eight social enterprises run by farmer collectives in the selected districts were also selected from these districts following the selection criteria. A total of 100 skilled workers involved in technology use in these enterprises were also selected as respondents in the study. Thus, the total sample size of the study was 153 comprising of the 45 MSME coconut entrepreneurs, 08 FPO CEOs and 100 skilled workers.

According to relevant literatures, sustainable entrepreneurship refers to the discovery, creation, and exploitation of opportunities related to entrepreneurship development that contribute to sustainability by generating social and environmental gains for others in society (Hockerts and Wustenhagen, 2010).It is meant to create a positive impact as well as a longevity of enterprise resisting shocks. The sustainable entrepreneurship development in coconut enterprises has been defined as the function of technological capability of enterprises, skill competence of workforce, scale readiness of innovations and of efficient forward and backward linkages in the study.

TECHNOLOGICAL CAPABILITY

Technological capability has been conceptualized as the ability of a firm to execute any relevant technical function that include the ability to develop new products, processes, technological knowledge and skill in order to obtain higher levels of entrepreneurial efficiency (Tsai, 2004).Variables used by Mori *et al.* (2016) in the technology capability index (TCI) was adapted with suitable modifications to measure the technological capability of the selected enterprises in the study. The technology capability index (TCI) was used in the measurement of the technological capability of coconut enterprises selected under the study. The index used multiple attributes related to the macro and meso level indices which was adapted from Mori *et al* (2016) and is presented in Figure 2.1.

The calculation of index was characterized by a one-dimensional score by embedding the standardized indicators based on a set of weights using the equation (1) adopted from Lu *et al*. (2007).

$$TCI = \sum_{i=1}^{x} w_i \bar{X}i \text{ ----------(1)}$$

where TCI is the Technology Capability Index, X_i the normalized variable, w_i the weights of of

$$X_i, \sum_{i=1}^{x} w_i = 1 \text{ and } 0 \leqslant wi \leqslant 1, \text{ and } i = 1, \ldots, n.$$

The determination of the weight set was made based on the results from Analytical Hierarchy Process (AHP) proposed by Saaty (1991). The steps followed in the establishment of weight sets according to the AHP procedure is presented as follows:

Formulation of index architecture
(Figure 2.1)

Pairwise comparative judgments on the selected components

Established the priorities among parameters or criteria among the hierarchy by making a series of judgments based on pair wise

comparisons. In this step the preference among the parameters were rated on the Saaty scale rating on 1-9 continuum.

Calculation of priority vectors

In this step with respect to the synthetic judgment matrices constructed the eigenvector (equation 2) and the maximum eigen value (equation 3) was calculated.

$$W_i = [\prod_{j=1}^{n} a_{ij}]^{1/n} / \sum_{k=1}^{n} [(\prod_{j=1}^{n} a_{kj})^{1/n}] \text{--------- (2)}$$

Where, aij is elements of pairwise comparison matrix between indicator i and indicator j n is matrix size w_i is weight of indicator i

$$\lambda_{max} = 1/n(\sum_{i=1}^{n} w'_n / w_n) \text{ --------(3)}$$

Here $5w'_n$ is the largest eigenvalue of the pair wise comparison matrix and $5w'_n$ is the eigen value of indicator i.

Consistency assessment

After performing pair wise comparison the consistency of the evaluations made by the judgments were checked. The consistency degree was obtained by dividing the consistency index (CI) (equation 4) and randomness index (RI) values from table of random index. According to Saaty (1991) RI values are calculated by the average CI value obtained by randomly generated reciprocal matrices. If the degree of consistency (CR) is greater than 0.1 (10.0 %), it is advised to recheck the pair wise comparison matrix.

CI = λ max – n / (n-1) ———————————(4) Where λ max is the maximum eigenvalue and n is the matrix size.

Skill competencies of work force

The psychological construct skill formed an inherent part of learning and was defined in terms of the complexity of the activities involved with respect to production processes as perceived by the workers or the management of an enterprise (Attewell, 1990). The conceptualizations of skill integrated soft skill competencies related to communication, interpersonal relations along with hard skills like technical competence, problem solving and decision-making, part of the required skill set competencies for workers. The scale developed by Manjunath *et al*., (2019) was used after suitable modifications for delineating the perceived skill competencies of workforce in the enterprises.

Scaling readiness of innovations

Scaling readiness as conceptualized following Sartas *et al.* (2020) which was related to the innovations practiced in an enterprise. The variable assumed great significance in the context of entrepreneurship development especially because the upscaling of a technology will also lead to down scaling of many practices followed in an enterprise as reported by Wigboldus *et al*. (2016). Based on the scale, scaling readiness was measured as a function of innovation readiness and innovation use. The scale consisted of items that measured innovation use and innovation readiness with score range 1-9 which is presented in. The scores were combined using the formula given below.

Scaling readiness = Innovation readiness * Innovation use

Forward and back ward linkages in an enterprise

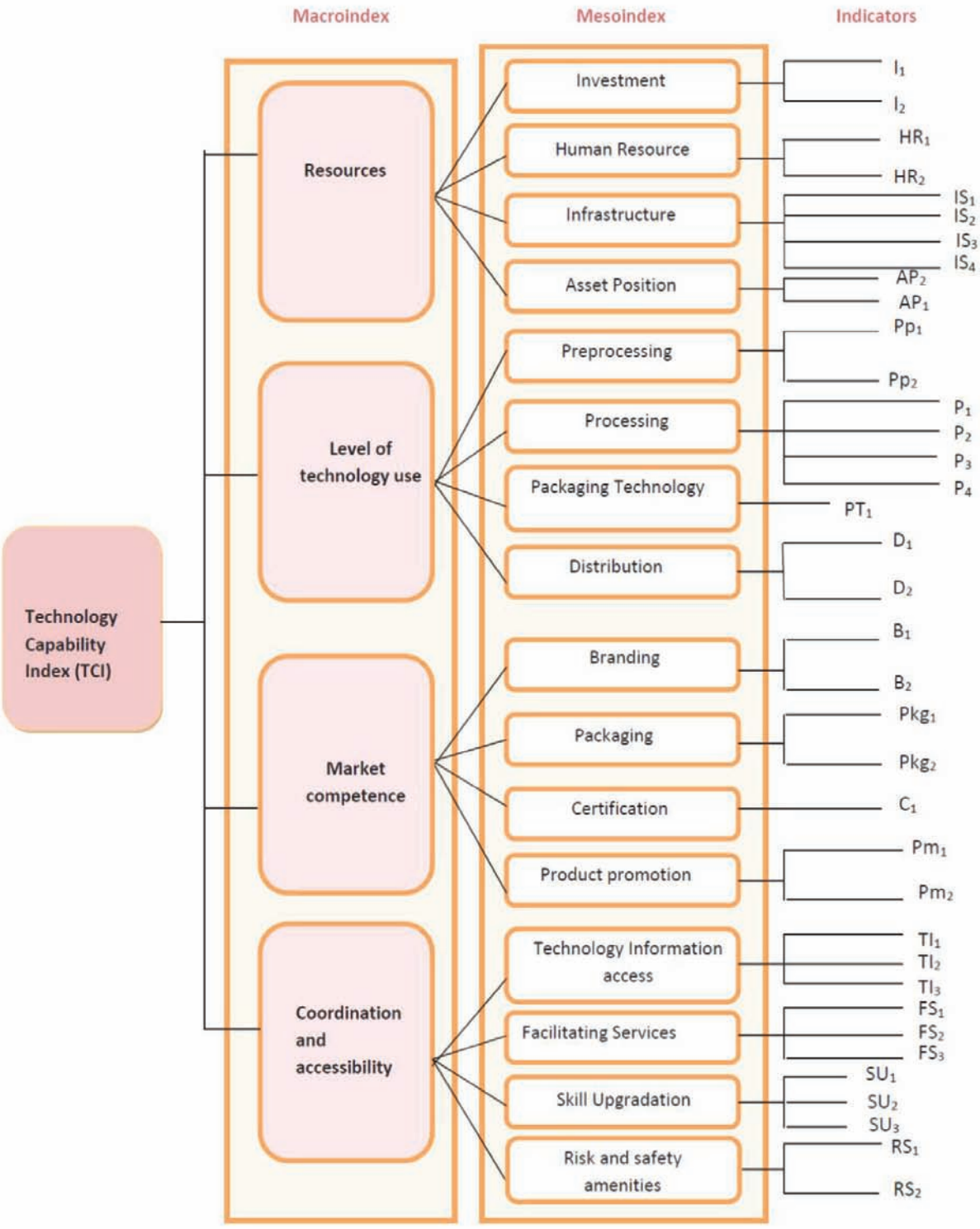

Figure 2.1 Technology capability Index (TCI) architecture

Table 3.1(A).Average TCI score micro-enterprises

Sl No	Particulars	Score	Min	Max	Standard deviation
1	Resources	0.40	0.30	0.53	0.06
2	Level of technology use	0.47	0.44	0.60	0.04
3	Market competency	0.33	0.30	0.52	0.04
4	Coordination and accessibility	0.17	0.10	0.32	0.08
5	**TC Score**	**0.38**	**0.31**	**0.40**	**0.03**

Table 3.1(B). Average TCI score of small enterprises

Sl No	Particulars	Score	Min	Max	Standard deviation
1	Resources	0.54	0.39	0.98	0.16
2	Level of technology use	0.84	0.67	1.01	0.10
3	Market competency	0.33	0.30	0. 52	0.04
4	Coordination and accessibility	0.51	0.18	0.85	0.23
5	**TC Score**	**0.63**	**0.48**	**0.80**	**0.10**

The study on supply and value chain channels represents the forward and backward linkages practiced by an enterprise to effectively transfer the products to the consumer. This was studied in terms of price spread and time lag. The intermediates in the supply channel were noted based on the responses from entrepreneurs and the share margin in each channel was recorded. The average lag time was also taken into account. Based on the secondary data on production cost and selling price the efficiency of each channel was calculated.

DISCUSSION

The determinants of sustainable entrepreneurship development in enterprises were separately analysed. Technological capability of enterprises was estimated as a measure of technology capability index (TCI). TCI was operationalized as a function of the enterprise resources (R), level of technology use (TU), market competence (MC) and coordination and accessibility

measures (CA). The weights for each of these variables were estimated using AHP as described in materials and methods. The estimates derived from AHP used in TCI calculation is presented in Tables 3.1(A-D).

The estimates reveled that micro enterprises got an average TC score of 0.38 and these enterprises gave more importance to level

Table 3.1(C) Average TCI score of medium and social enterprises

Sl No	Particulars	Score	Min	Max	Standard deviation
1	Resources	0.72	0.55	0.98	0.14
2	Level of technology use	0.94	0.81	1.11	0.09
3	Market competency	0.52	0.39	0.87	0.15
4	Coordination and accessibility	0.78	0.68	0.92	0.08
5	**TC Score**	**0.78**	**0.67**	**0.95**	**0.53**

Table 3.1(D). Average TCI score of coconut enterprises

Sl No.	Particulars	Score	Min	Max	Standard deviation
1	Resources	0.50	0.30	0.98	0.16
2	Level of technology use	0.66	0.44	1.11	0.23
3	Market competency	0.40	0.30	0.87	0.13
4	Coordination and accessibility	0.39	0.10	0.92	0.29
5	**TC Score**	**0.34**	**0.95**	**0.53**	**0.18**

of technology use in developing the technology capability of enterprise (0.47) followed by the resources (0.40). The market competency was given a tertiary importance and the least score was obtained for coordination and accessibility Table 3.1(A). While the technological capability of small enterprises showed that level of technology use was given more importance with a score of (0.84) followed by resources (0.54). But alike micro enterprises the small enterprises gave more importance to the coordination and accessibility (0.51) than to market competency (0.33) and their average TC score was found to be 0.63 (Table 3.1(B)). The average technology capability score of medium and social enterprises were found to be 0.78 and in these enterprises the level of technology use (0.94) was given more importance followed by coordination and accessibility (0.78) and the resources (0.72) were given more importance

than the market competency(0.52) (Table 3.1(C)). When the entire coconut enterprises in the study were considered the enterprises got an average TC score of 0.34. The enterprise categories were giving importance for level of technology use (0.66) in developing their technological capability followed by resources (0.5).When the entire enterprises under study were considered it is found that they were giving almost equal importance for the market competency and coordination and accessibility with scores 0.40 and 0.39 respectively (Table3.1(D)). The results reveal that the level of technology use was critically important in

Table 3.2 .Skill competencies of workers

Sl No	Skills	Micro	Small	Medium and Social	Average
1	Communication Skills	51.67	70.00	77.05	**66.24**
2	Technical Skills	47.17	69.78	74.52	**63.82**
3	Problem Solving	60.89	59.71	67.75	**62.78**
4	Decision Making	53.00	66.09	73.13	**64.07**
5	Inter Personal Skills	63.33	71.09	81.76	**72.06**
	Average	**55.21**	**67.33**	**74.84**	**65.80**

determining the technological capability of enterprises. The level of technology use in the preprocessing, processing, packaging and distribution held significant role in the determination of technology capability of enterprises. Thus the level of technology use is highly significant and more attention should be given in the viewpoint of technology capability.

The research on skill competence of workers in enterprises opined that they are equipped with 2/3rd of the necessity skills needed by the enterprise and they felt that they are good with Interpersonal Skills (72.06%). Followed by communication skills (66.24%), decision making skills (64.07%) and least were technical skills and problem solving skills. Employees' views about their skills were in contradictory with the entrepreneurs' opinion viz., interpersonal skills and was due to that there was no direct interaction between the entrepreneurs and employees. On the other hand employees were interacting better with their co-workers which made them to feel that they are in interpersonal skills.

Scaling readiness of innovations in enterprises were measured as the product of innovation use and innovation readiness under three levels viz. technological, marketing and management. The results showed that enterprises were giving more importance for the innovation use related to technological level Table 3.3(A). And micro enterprises expressed the highest innovation use in technology and management (15.66 and 2.66 respectively).The enterprises were giving more importance in technological level in innovation use compared to marketing and management. When innovation readiness were considered (Table 3.3 (B)). It is revealed that the medium and social enterprises were giving more importance for the innovation readiness in technological and management levels. And the results from Table 3.3(C) revealed that the average scaling readiness score was found be more for micro enterprise categories (with a score of 445.77) which implied that further interventions can be made in the existing technologies without much increase in the investment. The upgradations or interventions in the existing technologies in higher enterprise category required huge investment. This showed the suitability of existing technologies in the ecosystem of higher enterprise categories. It was evident from the results that the scaling readiness score of each enterprise category had significant role in the diagnosis of the current readiness and use of innovations and for the planning of the developmental strategies in enterprises.

Table 3.3(A) Distribution of enterprises categories on innovation use

Sl. No	Particulars	Micro enterprise (avg.)	Small enterprises (avg.)	Medium and social enterprises (avg.)	Total enterprises (avg.)
1.	Technological	15.66	15.33	15.07	15.43
2.	Marketing	4.55	4.6	4.54	4.54
3.	Management	2.66	1.9	1.6	2.28
4.	Total	22.86	21.8	21.23	22.06

Table 3.3(B) Distribution of enterprise categories on innovation readiness

Sl. No	Particulars	Micro enterprise (avg.)	Small enterprises (avg.)	Medium and social enterprises (avg.)	Total enterprises (avg.)
1.	Technological	6.67	6.7	6.84	6.77
2.	Marketing	6.13	6.2	5.6	6.01
3.	Management	6.66	7.9	8.3	7.3
4.	Total	19.5	20.8	20.76	20.09

Table 3.3(C) Distribution of enterprise categories on scaling readiness score

Sl.No	Scaling readiness	Micro enterprise (avg.)	Small enterprises (avg.)	Medium and social enterprises (avg.)	Total enterprises (avg.)
1.	Score	445.77	440.7348	443.1854	453.44
2.	Percentage	58.9	18.8	22.3	100

The results related to supply and value chain channels revealed that there were three significant channels of value chains identified among the micro enterprises. The channel that included retailer as intermediate between enterprise and consumer had a market efficiency of 8.54 and price spread of 8. The average lag time in this channel was found to be 3 days(Table 3.4(A)).There were two prominent supply chain channels in the enterprises of which the channel with no intermediary that directly procured from farmers had the highest market efficiency of 99 per cent and price spread was zero(Table 3.4(B)).

1. **Channel 1**

Enterprise ⟹ Retailer ⟹ Consumer

2. **Channel 2**

Enterprise ⟹ Wholesaler ⟹ Retailer ⟹ Consumer

3. **Channel 3**

Enterprise ⟹ Distributor ⟹ Wholesaler ⟹ Retailer ⟹ Consumer

Table 3.4(A) Value chain competence of enterprises

Micro Enterprises	Producers Selling Price	Consumers Price	Market Margin	Marketing Cost	Price spread	Market Efficiency	Average lag time (days)
Channel – 1	230	250	13.8	6.2	8.00	8.54	3
Channel – 2	230	251	14.8	6.2	8.37	8.23	10
Channel – 3	235	270	28.5	6.5	12.96	5.51	15
Small enterprises	**Producers Selling Price**	**Consumers Price**	**Market Margin**	**Marketing Cost**	**Price sread**	**Market Efficiency**	**Average lag time (days)**
Channel -3	190	213	16.50	6.50	11	6.22	15
Medium and social	**Producers Selling Price**	**Consumers Price**	**Market Margin**	**Marketing Cost**	**Price sread**	**Market Efficiency**	**Average lag time (days)**
Channel-3	141	160	12.50	6.50	12	5.27	15

The major supply channels identified in categories of enterprises were shown below

1. **Channel 1**

   Farmer ⟹ Enterprise

2. **Channel 2**

   Farmer ⟹ Trader ⟹ Enterprise

Table3.4 (B) Supply chain competence of enterprises

Channel	Producers Selling Price	Consumers Price	Market Margin	Marketing Cost/ Transportation Cost	Price spread	Market Efficiency
Channel 1	3000	3000	-30.00	30	0	99.00
Channel 2	2900	3200	270.00	30	9.375	8.70

Table.3.5 Correlation analysis of technological capability with selected variables.

Sl. No	Independent variables	Correlation coefficient (r_{sp})
1.	Scaling readiness	-0.037
2.	Skill competence of workforce	0.296*

*Significant at 0.05 level, **Significant at 0.01 level

Relationship between various dimensions of sustainable entrepreneurship development

Spearman correlation coefficient was used for finding relationship between the selected independent variables, skill competence of work force and scaling readiness with technological capability of enterprises Table 3.5.

The rsp values indicated significant correlation of technological capability of enterprises with selected skill competence of workforce at 5% level of significance and a significant negative correlation with scaling readiness. The results indicated the relevance of these selected variables in the technology capability analysis of enterprises.

When the sustainable entrepreneurship development were considered, the technological capability dimensions identified were resources, level of technology use, market competency and coordination and accessibility. The results indicated that level of technology use, the resources related to an enterprise such as human capital, infrastructure, investments *etc.* should be given the highest weight (0.38) compared to other identified variables. The level of technology use in preprocessing, processing, packaging and distribution closely followed with a weight of (0.34). When coconut enterprises were considered coordination and accessibility and market competency held almost equal level of importance with weigh 0.14 and 0.12 respectively. Skill competency of workforce was another important determinant that emerged significant and was included to define the sustainable entrepreneurship development framework. The skill competence determined the technology use pattern in coconut enterprises as evident from the significant relation with TC (Table 3.5). And the analysis of skill competencies revealed that the coconut workers lacked problem solving skills and technical skills. Innovation was another important attribute of technology capability which was analysed in terms of its scaling readiness. It involved putting in place necessary systems and processes for the enterprise to run efficiently and effectively

from the start accommodating all future growth prospects. Supply and value channels were having paramount importance in the development of sustainable entrepreneurship development. The efficiency of forward and backward linkages can structure a stable entrepreneurial background in enterprises. A frame work combining these selected dimensions was used to elucidate a sustainable entrepreneurship development framework for coconut enterprises as depicted in Figure.3.2.

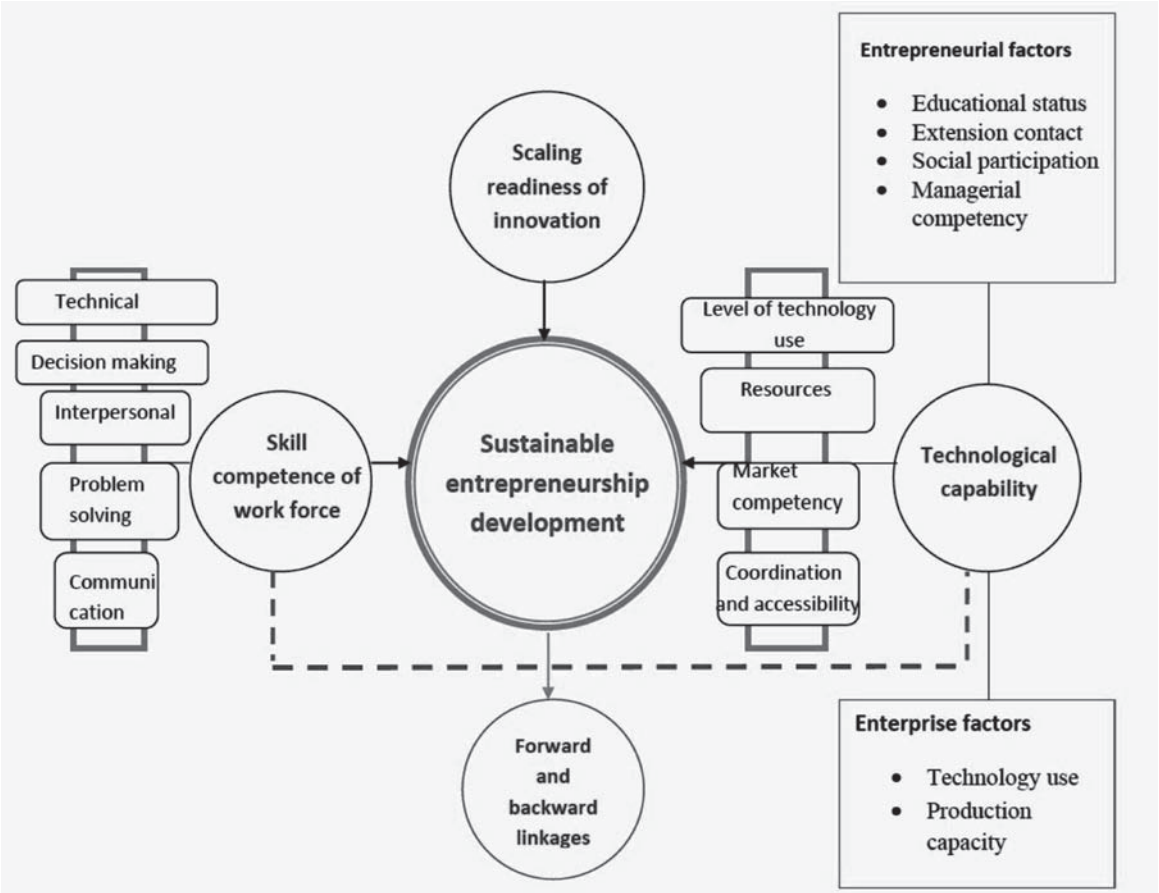

Figure 3.2 Conceptual model for sustainable entrepreneurship development

4. CONCLUSION

Sustainable entrepreneurship development signifies the prosperity of enterprises rather than profit maximization. The study suggested a frame work combining selected dimensions to explicate sustainable entrepreneurship development in coconut enterprises. Based on results sustainable entrepreneurship development in coconut enterprises has been defined as the function of technological capability of enterprises, skill competence of workforce, scale readiness of innovations and forward and backward linkages of the enterprise. Coconut based enterprises can reorient their area of importance to these four determinants and their related factors to achieve sustainability in their enterprises. Such a resilient and steady entrepreneurship development can create value that is beneficial for society through opportunity creation, and development in an uncertain environments.

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AN ANALYSIS OF FACTORS INFLUENCING THE ADOPTION OF IMPROVED BLACK GRAM VARIETIES IN PRAKASAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

The present investigation was conducted in six mandals of Prakasam district of Andhra Pradesh to study the factors influencing the adoption of improved black gram varieties. Total 60 farmers were randomly selected for the study and interviewed. The findings of this study revealed that most of the respondents were males (96.60%), middle aged (48.20%), had medium level of education (85.00%), farming experience (40.00%), experience in black gram cultivation (50.00%), land holding (68.20%), extension contact(68.20%), social participation (90.00%), medium extent of adoption (70.00%). Correlation analysis revealed that the variables like gender, education, experience in black gram cultivation had shown positive and significant association with extent of adoption. Farming experience had shown negative and significant association with extent of adoption. Variables like land holding, extension contact were found positive and non significant association with extent of adoption. Variable age has negative and non significant association with extent of adoption of improved black gram varieties.

INTRODUCTION

Black gram is one of the important pulse crops raised throughout India. Black gram output accounts for about 10 per cent of India's total pulse production. The production of black gram in the nation largely concentrated in five states namely, Uttar Pradesh, Maharashtra, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. These five states together contribute for around 70 per cent of entire black gram production in the country.

Andhra Pradesh state has its significance and one among the leading states in black gram production. This might be possible due to very prominent varieties released from this state by Regional Agriculture Research Stations, Lam (Guntur) and Tirupati. TBG-104 (Tirupati minumulu*),* LBG-17 (Krishnaiah), LBG-20 (Teja), LBG-402 (prabhava), LBG-611, LBG-623, PBG-1, PBG-107, PBG-32 are few among the best varieties released by these research stations. Government of Andhra Pradesh also insisting upon use of certified seed. State Department of

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Agriculture (A. P) distributed 2608 quintals of hybrid seed and provided 65.20 lakh rupees input subsidy for year 2019-20 to promote use of improved varieties. Prakasam district (area under study) has highest area under dry land in the coastal belt of A. P. Black gram is one of the major crops growing in the district, because of its low water requirement, droughttolerance and it is grown as a rain fed crop in the rabi season.In Prakasham district, the area under black gramcultivation is 20,118 hectares, 7,292 tonnes of production and 362 kgs/ha of productivity for the year 2017-18 (Source: Chief Planning Office, Ongole). It is mostly grown in the western part of Prakasham (i.e., Konakanamitla, Hanumanth-unipadu, Veligandla, Kanigiri, Pedacherlo palle, Chandrasekhara puram, Pamur mandals) where the drought incidences are severe and more frequent. There is a need to purchase the hybrid seed varieties, because improved varieties will tolerate drought and increases the productivity and thereby help the farmers in their livelihood sustenance particularly in this drought prone area. objectivesof the study were,

I. To find outthe profile of black gram growers

II. To determine extent of adoption of improved black gram varieties

III. To estimate determinants of adoption of improved black gram varieties

MATERIAL AND METHODS

Present study was conducted during the 2020 bythe following*ex-post facto* research design with the objective of investigating factors influencing the adoption of improved black gram varietieswas employed in the present study. The investigation was carried out in Prakasam district of Andhra Pradesh was selected purposively. Out of 56 mandals, six mandals namely Hamumanthunipadu, Veligandla, Kanigiri, Peda cherlo palli, Chandra Sekhara puram and Pamurwere selected purposively based on area and highest production. 2 villages were selected from each mandal by using random sampling procedure. From each selected village 5 farmers were selected by following simple random sampling method and thus making a total of 60 respondents. Primary data was collected through well-structured interview schedule administered by both personal and telephone interviews. The collected data was tabulated and categorized. Data was analyzed using descriptive statistics and correlation analysis was performed to know the significance of association between the factors under study. Computation was done by using SPSS statistical program.

RESULTS & DISCUSSION

Distribution of black gram growers according to demographic characteristics

From the Table 1, it could be inferred that 96.60 per cent ofgrowers were males and 3.40 per centwere females.Possible reason might be due to societal norms and role conflicts made the females not to enter into farming occupation.

Table 1shows that majority (48.20%) of the growerswerebelonged to middle age category, followed by the rest belonged to old age category(45.00%) and young age category (06.80%). Thereason might be due larger portion of the younger generation didn't prefer agriculture as they turn towards industries, information technology and management.

A glance of the Table 1 could be seen that majority (85.00%) of black gram growershad medium level of education and rest had high

(15.00%) levelof education.The probable reason might be due to the lack of encouragement from their family members for further continuance of their education,non availability of education facilities in the villages and poor economic condition.

The Table 1 describes that majority of the farmers have (40.00%) have medium level of farming experience followed by high (36.70%) and low (23.30) farming experience.

Results indicated in the Table 1 indicated that majority (50.00%) of the farmers had medium level of experience inthe black gram cultivation followed by high (35.00%) and low (15.00%) level of experience in black gram cultivation.

On perusal of Table 1 reported that majority (68.20%) of the black gram farmershad medium land holding size, followed by high(25.00%) and low (06.80%)level of land holdings. The possible reason might be that in recent times most of the families are of nuclear system and joint families are gradually fading away. So, that gradually the lands are becoming fragmented.

From the Table1, majority (68.20%) of farmers had medium level of extension contact, followed by those with high (20.00%) extension contact. Onlyfew (11.80%) of them had low level of extension contact.This might be due to Village Agriculture Assistants are readily available to the farmers after the advent of Raitu Bharosa Kendras. So, that farmers were frequently contactedthem in their own villages itself.

It could be comprehended from the Table 1,majority of the (90.00%) farmers had medium level of social participation followed by 10.00 per cent of them with high level of social participation and none of them (00.00%) with low level of social participation.This trend was due to extension agencies are encouraging farmers in social participation by helping them to form youth clubs, Commodity interest groups (CIGs), Rythu Mitra Groups (RMG's) etc., so that they got more exposure.

Table 2 indicated that majority (70.00%) ofthe respondents belonged to medium adoption category followed by 30.00 per cent,none of them were belonged to high and low adoption categories of improved black gram varieties respectively.

This might be due to the fact that, majority of the farmers had medium level of education, farming experience, land holding, medium level of extension, medium level of social participation.

Majority of the farmers opined that the high yielding(I) is the major reason for why farmers adopting improved black gram varieties followed by drought tolerance (II), pest and disease resistance (III) while only few farmers reported that high market price(IV) is the reason for adoption of improved black gram varieties.

Relationship between the profile of black gram farmers andtheirextent of adoption of improved black gram varieties

In order to identify characteristics related with adoption of improved black gram varieties, coefficient of correlation was worked out and presented in Table 4.

It is obvious from the data in Table 4 that the variables like gender and social participationfound positive and significant association with the extent of adoption at 5% level of significance.Variables like Education and

Table 1:Distribution of respondents according to demographic characteristics(n=60)

S.No	Category	Respondents	
		Frequency	Percentage
1.	**Gender**		
	Male	58.00	96.60
	Female	02.00	03.40
2.	**Age**		
	Young age	4	06.80
	Middle age	29	48.20
	Old age	27	45.00
3.	**Education** $\bar{X}$ **= 1.23, σ =0.593**		
	Low	0	00.00
	Medium	51	85.00
	High	9	15.00
4.	**Farming Experience** $\bar{X}$**= 2.6833, σ=1.20016**		
	Low	14	23.30
	Medium	24	40.00
	High	22	36.70
5.	**Experience in black gramcultivation** $\bar{X}$**= 1.87, σ=0.833**		
	Low	21	35.00
	Medium	30	50.00
	High	9	15.00
6.	**Land Holding** $\bar{X}$**= 2.83, σ=0.886**		
	Low	4	06.80
	Medium	41	68.20
	High	15	25.00
7.	**Extension Contact** $\bar{X}$**= 1.63, σ=0.938**		
	Low	7	11.80
	Medium	41	68.20
	High	12	20.00
8.	**Social Participation** $\bar{X}$**= 0.37, σ=0.663**		
	Low	0	00.00
	Medium	54	90.00
	High	6	10.00

Extent of adoption of improved black gram varieties

Table 2: Distribution of black gram farmers according to extent of adoption of improved black gram varieties (n=60)

S. No	Category $\bar{X}$=0.67, σ=0.475	Respondents	
		Frequency	Percentage
1	Low	18	30.00
2	Medium	42	70.00
3.	High	0	00.00

Table 3: Reasons for adoption of improved black gram varieties as perceived by respondents

S. No	Reasons For Adoption	Rank
1	HighYielding	I
2	Drought Tolerance	II
3	Pest and Disease Resistance	III
4	High Market Price	IV

experience in black gram cultivation were shown positive and significant association with the extent of adoption at 1% level of significance. Farming experience had shown negative, significance association with extent of adoption at 1% level of significance. Variables like land holding and extension contact were found positive and non significant relation with extent of adoption of improved black gram varieties. Age had shown negative and non significant association with the extent of adoption of improved black gram varieties.

CONCLUSION

Gender, Education, experience in black gram cultivation, social participation was found positive and significant relation with adoption. Scientists and extension agents thus need to

Table 4: Association between the profile of black gram growers and theirextent of adoption of improved black gram varieties (n=60)

S. No	Independent Variables	Correlation (r) value
1	Gender	0.263*
2	Age	-0.101NS
3	Education	0.198**
4	Farming Experience	-0.196**
5	Experience in black gram cultivation	0.156**
6	Land Holding	0.111NS
7	Social Participation	0.236*
8	Extension Contact	0.109NS

NOTE: * and ** indicates significance at 5% and 1%level of significance respectively.

NS= Non Significant.

focus on the positive determinants of adoption while developing any innovation and also during transfer of those technologies to the farmers. Since the ultimate aim of an innovation is to be adopted by the users of clients, it is better to consider the information on the factors that affect the adoption before the transfer of technology to the farmers.

Our findings are encouraging and call for emphasis to develop active and collaborative social participation approaches as opposed to passive and individualistic approaches. Education programs using proven approaches are also necessary to further increase the extent of adoption.

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EXISTING CULTIVATION PRACTICES FOLLOWED BY SAPOTA GROWERS

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ABSTRACT

Sapota (*Manilkara acharus* L.) is a popular and inexpensive Indian fruit that is widely grown across the tropics. Horticulture is a rapidly growing and profitable industry that is rapidly replacing traditional subsistence farming, particularly in rainfed, dry lands, hills, arid, and coastal agro-ecosystems. Palghar district was chosen since it has the most area under sapota agriculture. On the basis of the largest area under sapota cultivation, two tahsils, Dahanu and Palghar, were chosen from the identified district. Based on the information received about the sapota growers from selected tahsil in all 100 growers from Dahanu and Palghartahsils were selected randomly. It was observed that majority (100.00 per cent) of the farmers had used the Kali patti variety of the sapota. It is noticed that, 100.00 per cent of the farmers had used cow dung for filling of the pits. Majority (100.00 per cent) of the sapota growers considered giving cow dung, pruning and irrigation as most important after care of newly planted grafts. Tube well was the major source of irrigation as reported by 100.00 per cent of the respondents. 100.00 per cent of the farmers had installed electric pump. During winter season, more than four fifth (83.00 per cent) of the respondents had irrigated sapota at 14-15 days interval. During summer season, majority (87.00 per cent) of the respondents had irrigated sapota at 5-10 days interval. The cow dung was commonly used by 100.00 per cent the respond. It observed that cent (100.00 per cent) of the farmers had harvested the sapota fruits with help of labour. It reported that 80.00 per cent of the respondents used bamboo for harvesting of sapota.

Key word: Existing Cultivation, Practices Followed, Sapota Growers

INTRODUCTION

Agriculture, which has a major position in rural life, continues to be the backbone of our economy. Agricultural contributed 60% of GDP to the agriculture, forestry, and fishery sector in 2016-2017. Horticulture is a rapidly growing and valuable industry that is rapidly replacing traditional subsistence farming, particularly in rainfed, dry lands, hills, arid, and coastal agro-ecosystems. Horticultural crops are distinguished by high productivity, higher returns, greater potential for job creation and exports, a lower water requirement, and ease of adaptation to a variety of soil and waste land conditions. Sapota (Manilkara acharus L.) is a popular and inexpensive Indian fruit that is widely grown

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Table1: Distribution of the respondents according to the varieties grown

Sl. No.	Varieties	Respondents (N=100)	
		Number	Percentage
1.	Kali patti	98	98.00
2.	Kali patti + Cricket ball	02	02.00

across the tropics. It is known by many names viz., chikku, sapodilla plum, zapota and nose-berry. Apart from adoption of production technologies developed by university the farmers are using their traditional methods for management of sapota crop. In order to understand the applicability and suitability of their practices, keeping in this view the present study Existing Cultivation Practices followed by Sapota Growers in Palghar District

MATERIAL AND METHODS

The research was carried out in the Palghar district of Maharashtra's Konkan area. Among the four Konkan districts, Palghar district ranks first in terms of sapota area, production, and productivity. Palghar district was purposefully chosen for the current study based on these facts. The purpose of this study was to learn about the current growing practises used by sapota growers. Ex-post-facto design is used when a study progresses from present to future based on interpretations of events or facts that have already occurred. For this study, an ex-post-facto research design was used.

RESULT AND DISCUSSION

1. Existing cultivation practices followed by the sapota growers.

This part comprises information on the existing growing procedures used by sapota producers in sapota cultivation.

1.1Varieties grown

The details about varieties grown by the sapota growers are given Table1.

It is revealed that Table1, that majority (100.00 per cent) of the farmers had used the 'kali patti' (early) variety of sapota and 02.00 per cent of the farmers had also planted 'cricket ball' variety of sapota.

1.2. Selection of planting material.

It is always essential to select better quality planting material for planting any crop in the field. In order to assess different criteria used by the sapota growers for the selection of proper grafts, suitable questions were included in the schedule. Responses of the farmers in this aspect are narrated in the Table 2.

It is seen that from Table 2 majority (25.00 per cent) of the farmers had selected 'Disease free and get from society', while 12.00 per cent of the farmers had selected 'variety, fruit demand and easily available, 05.00 per cent of the farmers had selected '3 year old' however, only 03.00 per cent of the farmers had selected more cultivation and more yield for planting material.

1.3. Planting

1.3.1. Size of pit

The details about size of pits dug by the sapota growers for planting the grafts are given Table3.

Table 2: Distribution of the respondents according to the selection criteria of planting material

Sl. No.	Criteria used for the selection of planting material	Respondents (N=100)	
		Number	Percentage
1.	Fruit demand	12	12.00
2.	Variety	12	12.00
3.	Strong stem	05	05.00
4.	More cultivation	03	03.00
5.	Disease free	25	25.00
6.	Get from society	25	25.00
7.	Market demand	03	03.00
8.	3 years old	05	05.00
9.	Easily available	12	12.00
10.	More yield	03	03.00

From Table 3, it is revealed that more than fifty per cent (57.00 per cent) respondents had pit size of '3 x 3 x 3 ft'. While 32.00 per cent of the farmers dug out pit as per the size of '2.5 x 2.5 x2.5 ft', whereas, 06.00 per cent of farmers dug out pit sa per the size of '1x1x1ft' and 02.00 per cent and 03.00 per cent of the farmers had pit size of '2 x 2 x 2 ft' and '1.5 x 1.5 x 1..5 ft' respectively, for the sapota grafts cultivation. Further, sapota growers reported that bigger size of pit helped in better establishment of grafts because of proper and accumulation of more organic matter.

Table3: Distribution of the respondents according to the size of pits dug for planting sapota grafts.

Sl. No	Size of pit (feet)	Respondents (N=100)	
		Number	Percentage
1.	1 x 1 x 1	06	06.00
2.	1.5 x1.5 x 1.5	03	03.00
3.	2 x 2 x 2	02	02.00
4.	2.5 x 2.5 x2.5	32	32.00
5.	3 x 3 x 3	57	57.00
	Total	**100**	**100.00**

Table 4: Distribution of the respondents according to the filling of pits by manure or fertilizer

Sl. No	Manure or fertilizer	Respondents (N=100)	
		Number	Percentage
1.	Cow dung	100	100.00
2.	Single Super Phosphate	15	15.00
3.	Goat manure	16	16.00
4.	Compost	100	100.00

1.3.2. Filling of pits

The information pertaining to filling of the pits by manure or fertilizer before planting of sapota is depicted in Table 4.

It is observed that from Table 4 that, cent per cent (100.00 per cent) of the farmers had used 'cow dung and compost' for filling of pits, while 15.00 per cent of the respondents had used 'single super phosphate' for filling pits. Whereas 16.00 per cent and of the respondents had used and 'goat manure', respectively.

1. 3.4. Spacing

The details about spacing followed by the sapota growers are given in Table5.

It observed from Table 5 that, majority (63.00 per cent) of the respondents had followed a spacing of '10 m x 10m' between two plants and rows, while 25.00 per cent of the sapota growers had planted the grafts at a distance of '12 m x 12 m'. Whereas 08.00 per cent and only 04.00 per cent of the farmers had followed a spacing '8 m x 8 m' and '7 m x 7 m', respectively while planting of sapota grafts.

1.3.5. After care of sapota grafts

The details about after care followed by sapota grower are given in Table 6.

It is revealed from the Table 6 that, cent per cent (100.00 per cent) of the sapota growers considered 'irrigation, pruning and manuring' as

Table5: Distribution of the respondents according to the spacing followed for the sapota crop.

Sl. No	Spacing (meters)	Respondents (N=100)	
		Number	Percentage
1.	7 x 7	04	04.00
2.	8 x 8	08	08.00
3.	10 x 10	63	63.00
4.	12 x12	25	25.00
	Total	**100**	**100.00**

Table 6: Distribution of the respondents according to the aftercare practices followed by sapota growers for newly planted grafts

Sl. No	Aftercare practices	Respondents (N=100)	
		Number	Percentage
1.	Pruning	100	100.00
2.	Irrigation	100	100.00
3.	Manuring	100	100.00
4.	Intercropping	05	05.00

most important after care practice followed by 'intercropping' (05.00 per cent) sapota growers considered as an after care practice for cultivation of newly planted sapota grafts.

1.2.4. Application of manures and fertilizers

1.2.4.1 Organic fertilizers

The pertaining information to manures and fertilizer applied by the sapota growers for their orchards is presented here under

The data from Table 7 indicate that among the farmers who used the manures or fertilizers, the 'cow dung' was commonly used by 100.00 per cent of the respondents, whereas 'single super phosphate' was applied by 14.00 per cent of the farmers and 09.00 per cent of the respondents used 'urea'. Whereas 16.00 per cent of the respondents, used 'goat' manure whereas 04.00 per cent used 'vermi' compost and 'murate of potash' and only 01.00 per cent used 'jiwamrut' respectively.

1.2.5 Crop protection

1.2.5.1 Incidence of pests

The findings in respect of the pests on the sapota crop and their control measures

Table 7: Distribution of the respondents according to the application of manures or fertilizers followed by them

Sl. No	Manure or fertilizer	Respondents (N=100)	
		Number	Percentage
1.	Cow dung	100	100.00
2.	Jiwamrut	01	01.00
3.	Vermi compost	04	04.00
4.	Single Super Phosphate	14	14.00
5.	Murate of potash	04	04.00
6.	Urea	09	09.00
7.	Goat manure	16	16.00

Table 8: Distribution of the respondents according to the identification of pests observed in their field

Sl. No	Identified pests	Respondents (N=100)	
		Number	Percentage
1.	Stem borer	02	02.00
2.	Sapota seed borer	62	62.00
3.	Leaf borer	02	02.00
4.	Flower bud borer	49	49.00

adopted by the respondents there upon are presented in this part. It was noticed that 100.00 per cent of the respondents suffered from the problem of pests.

It was reported from the Table 8 that 62.00 per cent of the sapota growers identified 'sapota seed borer' in their orchard followed by 'flower bud borer' (49.00 per cent) 'termites' (02.00 per cent) 'stem borer' and 'leaf borer'.

1.2.5.1 Incidence of disease

The findings in respect of the disease on the sapota crop and their control measures adopted by the respondents there upon are presented in this part. It noticed that 100.00 per cent of the respondents suffered from the problem of disease.

The disease identified by the sapota growers is presented in Table 9.

It was observed from the Table 9 that all (100.00 per cent) of the sapota growers identified 'loranthus' in their orchard followed by 'fruit drop' (39.00 per cent).

It reported from the table 10 that cent per cent (100.00 per cent) of the sapota growers did the 'removal of loranthus' in their orchard followed by spraying of 'cow urine' (03.00 per cent) spraying of 'chloropyriphosemidachloride' (02.00 per cent) and applied 'smoke' and 'jiwamrut, dashparniark'(01.00) .

1.2.6 Harvesting

It was observed that cent per cent (100.00 per cent) of the farmers had harvested the sapota fruit with the help of hired labours.

1.2.6.1 Method of harvesting

It was observed that cent per cent (100.00 per cent) of the respondents used 'bamboo' for harvesting of sapota (Bedni). Whereas, In their opinion, it prevents fruit drop and retains in the fruits bunch.

CONCLUSION

In this research, Dahanu and Palghar districts are mainly characterised because of the sapota. Both the tahsils occupies sizeable area under sapota. Efforts are being made at different levels to maximise the area, production and productivity of sapota in konkan region. On research front, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli has evolved varieties as well improved sapota cultivation practices. It was important to understand the existing cultivation practices followed by the sapota growers. It is important to increase the production

Sl. No	Identified Diseases	Respondents (N=100)	
		Number	Percentage
1.	Fruit drop	39	39.00
2.	Loranthus	100	100.00

1.2.5.1 Control measures

Distribution of the respondents according to their control measures

Sl. No	control measure	Respondents (N=100)	
		Number	Percentage
1	Spraying of cow urine	03	03.00
2	Spraying of jiwamrut, dashparni ark	01	01.00
3	Spraying chloropyriphosemidachloride	02	02.00
4	Spraying of BHC powder	01	01.00
5	Removal of loranthus	100	100.00
6	Smoke	01	01.00

and productivity of sapota which will bring economic prosperity to farmers.From the study, it become clear that cent per cent sapota growers have followed the management practices recommended by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. Practices like variety, filing of pits, after care of newly planted grafts, sources of irrigation, water lifting devices, organic manures, plant protection measures. However care need to be taken on some practices viz. spacing, size of pits, irrigation interval and use of training the sapota growers in relation to the sapota harvester. Thus the special efforts need to be made to by concerned agencies disseminate the recommended management practices of the university in the region to the orchad owners as well as care taker of the orchad.

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ATTITUDE OF FARM WOMEN TOWARDS SELF HELP GROUPS

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ABSTRACT

Self Help Group (SHG) is proving to be a boon for rural women and through which they are exposed to various strata of our society. This help inculcating their mind with new knowledge. Hence, it becomes necessary to elicit their attitude towards SHG. The study was conducted in Ahmednagar, Maharashtra. The SHG for study were under the jurisdiction of Bableshwar KVK, 10 villages from Rahata and Shrirampur tehsils were selected randomly. The SHG that had completed five or more years from their formation had been choosen. From each village one SHG was selected. 15 members from each SHG, thus making a sum of 150 respondents. The study revealed that majority SHG women members belong to middle age category, had secondary education, belonged small size of family, possess small size of land holding, medium level of annual income, practice agriculture as family occupation, were member of one organization, had medium economic motivation, medium level of market orientation and medium category of income from SHG. In order to quantify attitude, a scale with 21 statements was developed that recorded responses on three-point continuum viz. highly favourable, moderately favourable and least favourable. Overall 60.67% SHG member have moderately favourable attitude, 22.66% have highly favourable attitude, 16.67% have least favourable attitude. The independent variables, *viz.* annual income, occupation, social participation, economic motivation, market orientation and income generated from SHG have positive and significant correlation with their attitude of farm women towards SHG. Independent variable age, education, family size, land holding has negative and non-significant correlation with attitude of farm women.

***Keywords*:** Attitude, correlation, Self Help Group (SHG), krishi Vigyan Kendra (KVK)

INTRODUCTION

For loans, poor households rely heavily on the informal sector. This is due to the fact that banks are either not present in rural areas or need collateral against a loan, which poor people cannot supply. As a result, the impoverished are obliged to take out loans from moneylenders who demand exorbitant interest rates and take advantage of borrowers. Organizing people into SHGs is one solution to this challenge. In a typical SHG, 15 to 20 neighbors save on a monthly basis to form a savings pool. A Self-Help Group becomes eligible for a bank loan without presenting any collateral after saving regularly for

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a few years. The funds from bank loan will be used to increase the group's revenue and employment options. [IX Economics NCERT]

SHG is regarded as one of the most important means of development for women around the world. The goal of forming and nurturing a Self-Help Group is to motivate and help women in engaging in productive activities that will improve their quality of life. [Chandan Kumar Panda, 2018] Individual efforts are insufficient to address these issues, which necessitate collaborative action. As a result, SHG has the potential to be a vehicle for change for the poor and marginalized. To foster self-employment and poverty alleviation, SHGs use the concept of "Self-help." Self-Help Groups are typically formed to obtain credit for pursuing income-generating activities, fulfilling societal needs/obligations, encouraging savings, reducing household consumption spending, obtaining credit quickly at cheap interest rates, and assisting one another in their own development. Along with women empowerment, which is in the innovation stage, it is critical to examine women's attitudes about Self-help Groups, as attitude is a critical component for the successful implementation and execution of any development practice. As a result, a measure has been devised to assess women's attitudes regarding Self-Help Groups.

MATERIALS AND METHODS

The present study was planned and carried out in Rahata and Srirampur tehsils of Ahmednagar district of Maharashtra state on the basis of maximum number of self-help groups. From each tehsil five villages were selected having maximum self-help groups and from each village one self-help group which were active, progressive and which were completed maximum five years were selected randomly. Hence total 150 respondents from 10 SHGs of 10 villages from two tehsils were drawn. Ex-post facto research design was used. In order to quantify the attitude towards Self Help Group, an attitude scale was developed. It consisted 21 statements which were administered to the respondents to elicit their responses on three-point continuum viz. highly favourable, moderately favourable and least favourable with assigning a numerical score of 3, 2, and 1 for positive statement and reverse scoring procedure was followed for the negative statement.

RESULT AND DISCUSSION

The result obtained from research study in respect of Attitude of Farm Women Towards SHG as well as relevant discussions have been presented as follows. This hidden psychological construct has been defined as the most distinctive and indispensable idea in current social psychology by a prominent psychologist. A person's attitude can be shaped by their past and present experiences.

Personal, socio-economic and psychological characteristics of the farm women

From the study it can be concluded that majority SHG women members belong to middle age category, had secondary education, belonged small size of family, possess small size of land holding, medium level of annual income, practice agriculture as family occupation, were member of one organization, medium economic motivation category, medium level of market orientation and medium category of income from SHG

Table 1. Distribution of Respondent's according to Personal, socio-economic and psychological characteristics

Characteristics	Frequency (n= 150)	Percentage
Age(years)		
Young (Up to 35)	54	36.00
Middle (36 to 55)	88	58.66
Old (56 & above)	08	5.34
Education		
Illiterate(No education)	14	9.3
Pre-Primary education(Up to 4^{th})	30	20.00
Primary education(5^{th} to 7^{th})	19	12.66
Secondary education (8^{th} to 10^{th})	48	32.00
Higher secondary (11^{th} to 12^{th})	26	17.38
Graduate (Degree)	13	8.66
Family Size		
Small(Up to 5)	84	56.00
Medium(6 to 10)	59	39.34
Large(11 and above)	07	4.66
Land Holding (ha)		
Marginal (up to 1.00)	44	29.33
Small (1.01 to 2.00)	80	53.33
Semi-medium(2.01 to 4.00)	18	12.00
Medium (4.01 to 10.00)	08	5.34
Annual Income (Rs.)		
Low (up to Rs.56,666)	47	31.34
Medium(Rs.56,667 to 2,28,014)	87	58.00
High (Rs.2,28,015)	16	10.66
Occupation		
Agriculture	77	51.35
Dairy	40	26.66
Labour	25	16.66
Business	08	5.33
Social Participation		
Participation in1 organization	150	100.00
Participation in 2 organization	42	28.00
Participation in 3 and more organization	13	8.66

Economic Motivation		
Low (up to 6.75455)	35	23.33
Medium (6.75456 to 10.7121)	77	51.33
High (10.7122)	38	25.34
Market Orientation		
Low (up to 1.67367)	58	38.98
Medium (1.67368 to 3.36632)	70	46.66
High (3.36632 and above)	22	14.66
Income Generated from SHG		
Low (up to 14,359)	55	36.66
Medium (14,360 to 93,529)	78	52.00
High (93,530 and above)	17	11.34

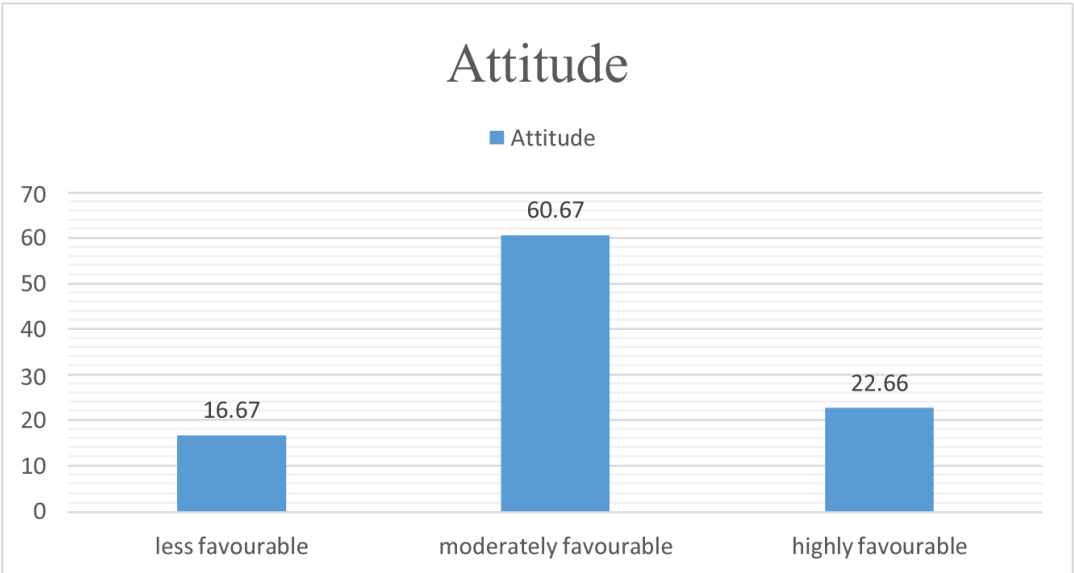

Fig. 1 Distribution of Respondents according to Attitude

Attitude of farm women towards SHG

In the present study, it has been operationally defined as "the favourable or unfavourable feeling of an individual towards the Self-Help Group".

Figure 1. indicates that three fifth i.e. 60.67 per cent of the respondents had moderately favouable attitude while 22.66 per cent of the respondents had highly favourable attitude towards SHG and 16.67 per cent of the respondents have less favourable attitude towards SHG.

CONCLUSION

Results of the above research study reveals that the majority of the respondents have moderately favourable to highly favourable

Table 2. Demonstrates the distribution of respondents based on their attitude

Sr. No	Statements	Highly Favourable	Moderately Favourable	Least Favourable
1.	Self Help Group enhances the women empowerment in rural area.	110 (73.33)	32 (21.33)	08 (5.34)
2.	Self Help Group is a convenient mechanism to increase member's income.	40 (26.67)	94 (62.67)	16 (10.66)
3.	Self Help Group is a poor source to start big enterprise.	78 (52.00)	44 (29.34)	28 (18.66)
4.	Self Help Group increases purchasing power of women.	78 (52.00)	49 (32.67)	23 (15.33)
5.	Self Help Group does not give equal monetary benefit to all members.	52 (34.66)	21 (14.00)	77 (51.34)
6.	Self Help Group is a boon for poor rural women.	88 (58.66)	62 (41.34)	00 (00.00)
7.	Self Help Group has developed self confidence in rural poor.	85 (56.66)	65 (43.34)	00
8.	Self Help Group had created conflict between group members.	32 (21.34)	03 (2.00)	115 (76.66)
9.	I believe that SHG provides forum for starting new business.	83 (55.33)	38 (25.33)	29 (19.34)
10.	Self Help Group creates misunderstanding within the members.	04 (2.67)	18 (12.00)	128 (85.33)
11.	Self Help Group provides opportunity to solve those issues which are difficultto solve individually.	95 (63.33)	50 (33.33)	05 (3.34)
12.	I believe that input buying capacity of women improved by joining Self Help Group.	76 (50.67)	62 (41.33)	12 (8.00)
13.	Self Help Group provides timely credit facilities to women throughout the year.	110 (73.34)	40 (26.66)	00 (00.00)

14.	Self Help Group helped me to improve my social and political status in society.	21 (14.00)	78 (52.00)	51 (34.00)
15.	Government does not provide sustainable market for sale of Self Help Group products.	123 (82.00)	27 (18.00)	00 (00.00)
16.	Self Help Group is not a competent source for women to avail credit as and when needed.	14 (9.33)	17 (11.34)	119 (79.33)
17.	SHG provides solution to solve day to day family difficulties.	137 (91.34)	11 (7.33)	02 (1.33)
18.	Self Help Group has improved decision making power in me.	69 (46.00)	81 (54.00)	00 (00.00)
19.	Self Help Group is the strength of progress for rural women.	110 (73.33)	40 (26.67)	00 (00.00)
20.	Subsidy on Self Help Group loans helps faster repayment of amount timely.	65 (43.34)	58 (38.66)	27 (18.00)
21.	Family members respect me as amember of Self Help Group.	84 (56.00)	49 (32.67)	17 (11.33)

attitude towards SHG. Micro finance is provided to the poor women and it helps them to start new activities moreover the farm women becomes economically self-reliant and ultimately their standard of living is uplifted.

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KNOWLEDGE OF THE FARMERS ABOUT MECHANIZED PADDY CULTIVATION THROUGH CUSTOM HIRING SERVICE CENTRES (CHSC)

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ABSTRACT

This research was conducted in Udupi district of Karnataka. Rice was the staple food in Udupi and farmers were growing the paddy from many decades. Due to the constraints of the labour, the farmers had adopted the mechanization paddy. In this particular study, we had analysed the knowledge level of the farmers about mechanization in paddy. The framers can hire the machineries from Custom Hiring Service Centres (CHSC). The results shows that, nearly three fourth (73.33 %) of respondents possessed medium level of knowledge regarding mechanized paddy cultivation through government CHSC followed by low (16.67 %) and high (10.00 %). Whereas, in private CHSC, 71.67 per cent of respondents belongs to medium level of knowledge followed by high (18.33 %) and low (10.00 %).

Key words: Custom hiring, Mechanization and Knowledge

INTRODUCTION

India is a predominantly agricultural country. Its population depending on agriculture is 263.1 million (54.6 %). As per the population Census 2011, agriculture supports 13.74 million workers, of which 23.61 per cent are cultivators and 25.67 per cent agricultural workers Average operational land holding size in the country is estimated at 1.16 hectare. About 80 per cent of the land holdings are operated by marginal and small farmers owning less than 1 and 1 to 2 hectare holdings, respectively. Majority of the Indian population resides in the rural areas and their main occupation is agriculture. Agriculture requires enormous labourers for all the agricultural operations. The shortage of labour affects the agriculture. Hence, the mechanization can act as a coping mechanism for the labour unavailability. Esmay and Hall (1972) defined agricultural mechanization as the science application of mechanical aids for increased production, processing and storage of food with less drudgery and increased efficiency. Mechanization enhance input-use efficiency, suppress the greenhouse gas emission and control the environmental pollution, ensure health and safety of farmers, and can bring savings in input and labour costs. During the year 2030 the demand of cereals expected to reach 43.82 million tons at an anticipated per

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capita income growth rate of 2 per cent and 50.62 million tons at an income growth of 3 per cent (Baqui*et al,* 2007). Hence, mechanization playing a vital role in farming for enhancing the agricultural productivity and the knowledge level of the farmers was studied in this research.

MATERIAL AND METHODOS

During the year 2017-18 this research had been carried out in Udupi district of Karnataka state. The ex-post facto research design was used in this study. Purposefully the study was conducted in Udupi because this is one of the first districts to adopt mechanization in paddy and even Udupi comprises of more *kharif* and rainfed paddy cultivation area. The district comprises of three taluks *viz.,* Udupi, Karkala and Kundapur. Only two taluks selected *i.e.,* Udupi and Kundapur where area under paddy cultivation is more. Custom Hiring services utilized by the farmers from both government CHSC and private CHSC were served as respondents for the study. Among those using purposive sampling design 30 farmers from each government CHSC and private CHSC selected *i.e.,* 60 sample farmers from each taluk *viz.,* Udupi and Kundapur were selected as respondents for the study. Thus, 120 sample farmers had had considered and data was collected from the respondents through personal interview method by using structured interview schedule.

Measurement of farmer's knowledge about mechanization

Anastasi (1961) had given "Teacher made test" and was employed to analyse the knowledge level. All-important machineries and required services for paddy cultivation were listed separately in consultation with the agriculture experts. Framed the questions and answers were carefully. For each correct answer '1' score had assigned and '0' to wrong answers. Based on the response obtained, the knowledge level was quantified by using frequency and percentage.

RESULTS AND DISCUSSION

Knowledge of the farmers about mechanized paddy cultivation through CHSC

3.1 Overall knowledge level of the farmers

It could be noticed from Table 1 that 73.33 per cent of respondents had medium level of knowledge of mechanized paddy cultivation through government CHSC followed by low (16.67 %) and high (10.00 %). Whereas knowledge level of mechanized paddy cultivation through private CHSC by respondents was 71.67 per cent of respondents belongs to medium level of knowledge followed by high (18.33 %) and low (10.00 %).

A perusal of Table 1 reveals that more than half (73.33 %) of the government CHSC respondents and 71.67 per cent of private CHSC respondents had medium level of knowledge about the mechanized paddy cultivation through custom hiring and service centres. It is due to the fact that the farm mechanization is slowly increasing in this region and farmers of this reason still were not exposed to improved agriculture implements used in the paddy cultivation. However, they are eager to know the technology of farm mechanization and opt for their implementation. These findings are in line with the Shoba *et al.* (2018).

3.2 Knowledge level of farmers about services provided by government and private CHSC

It is perusal from Table 2 that reveals equal (100.00 %) per cent of government CHSC and private CHSC respondents had knowledge with respect to machineries repair services, machineries repair service charges, technicians availability, mobile SMS facility, provision of printed information by CHSC, availability of experts in CHSC of their respective CHSC in the study area. The possible reasons for the above results are good level of education, medium level of extension contact, labour scarcity issue, awareness programmes carried out by government departments, low material possession of farmers, marginal and small land holdings and medium level of mass media participation.

It is observed from same Table 2 that (73.33 %), (41.67 %), (25.00 %),(21.67 %) and 16.67 per cent of government CHSC respondents known about fuel and lubricants availability, other inputs availability like compost, availability of on-line booking, machineries spare parts availability, conduct training and demonstrations by government CHSC respectively. Majority of farmers known of training and demonstrations is due to reason of medium level of extension participation. The possible reasons for Low knowledge of respondents for other services is less requirement and interest by the respondents.

Among private CHSC respondents (61.67 %), (46.67 %), (41.67 %) and 38.33 per cent had knowledge with respect to availability other inputs like compost, conduct training and demonstrations, machineries spare parts availability and fuel and lubricants availability by private CHSC. More than fifty per cent farmers knew fuel and lubricants availability may be reason of repairs are done only by owner of the machineries, very less number demonstrations conducted by private CHSC may possible reason for less knowledge of demonstrations and non-requirement and interest by the respondents may be the reason for less knowledge about services of Custom Hiring Centres. These findings are in line with the Koike (2009).

3.3 Knowledge of farmers about mechanized paddy cultivation through CHSC

Majority (70.00 %) of respondents knew about nursery bed preparation among the government CHSC respondents whereas only 28.33 per cent knew about knowledge about nursery bed preparation for machine transplanting because of the fact that government CHSC give training to farmers in preparing nursery bed preparation, for private CHSC respondents seedling trays provided by CHSC itself.

It is observed from Table 3 except plant protection measure equipment's respondents got sufficient knowledge with respect to use, usage hours of farm implements, hiring charges per hour, extent of use and availability of machineries like tractor, power tiller, rotovator, M.B. Plough, cultivator, cage wheel, transplanter, combined harvester and even paddy threshers in their respective CHSC. This might be that the farmers could afford to utilize these implements which were reaching to their economy because of availability on the hiring basis in the study area.

It is observed from same Table 3 that (28.33 %), (46.67%), (71.67 %) and 86.67 per cent of government CHSC respondents known

about use, usage hours of farm implements, hiring charges per hour, frequency of use of HTP sprayers, power sprayers, gutter sprayers, and knapsack sprayers for plant protection measures. In Udupi district majority of the farmers are not taking the spraying for pest and diseases but they have enough knowledge about knapsack sprayers because it is easily available and not complex in operation.

Private CHSC respondents (86.67 %), (68.33 %), (48.33 %) and 30.00 per cent knew about use, usage hours of farm implements, hiring charges per hour, frequency of use of knapsack sprayers, gutter sprayers, power sprayers, and HTP sprayers respectively. private CHSC respondents also have knowledge about knapsack sprayers because farmers got good extension contact with the private CHSC.

Both government and private respondents had good knowledge about weeders and its use, usage hour, availability in CHSC, hiring charges because it can be used easily in machine transplanted paddy cultivation.

Majority of the farmers have knowledge about combined harvester because labour shortage, loss during harvesting, timely harvesting and cost of harvesting are crucial in rice. Harvesting as well as threshing are the most important practices in the whole field operations, which were laborious involving human, timely harvesting is most important, as delayed harvesting results to a considerable loss of food grains and straw owing to over maturity leads in loss of grains due to shattering and seed bed preparation also delays and even sowing operations for the upcoming crop. The paucity of labour in the peak harvesting season is forcing the farmers delay harvesting causing high postharvest losses and sometimes loss of the crop by natural calamities.

Combine harvesters are economically important labour saving inventions, significantly reducing the fraction of the population engaged in agriculture. The above reasons may be factor which influencing farmers to gain the knowledge about combined harvester. These outcomes are in line with Nagraj (2012).

CONCLUSION

Mechanization is important for agriculture. Day by day land is reducing but population is increasing. To meet food security to our growing population the mechanization will act as a catalyst. Majority of the Indian population resides in the rural areas and their main occupation is

Table 1. Overall knowledge the farmers regarding mechanization **(n=120)**

Particulars	Government CHSC n=(60)		Private CHSC n=(60)	
	Frequency	Per cent	Frequency	Per cent
Low	10	16.67	6	10.00
Medium	44	73.33	43	71.67
High	6	10.00	11	18.33
	Mean =30.76	S.D=2.27	Mean =31.67	S.D=2.97

Table 2. Knowledge level of respondents about services provided by government and of private CHSC

n=120

Sl. No	Statements	Government CHSC n= 60		Private CHSC n= 60	
		Frequency	Per cent	Frequency	Per cent
I	**Machineries availability**				
	Availability of paddy cultivating machineries	60	100.00	60	100.00
	Availability of modern machineries	60	100.00	60	100.00
	Availability of pre booking facility	60	100.00	60	100.00
	Availability ofexpert drivers and operators	60	100.00	60	100.00
	hiring charges for farm machineries	60	100.00	60	100.00
II	**Repair services**				
	Machineries repair services	60	100.00	60	100.00
	Availability ofmachineries spare parts	25	41.67	28	46.67
	Charges for machineries repair services	60	100.00	60	100.00
	Fuel and lubricants are available	10	16.67	37	61.67
	Technicians are available for repairs	60	100.00	60	100.00
III	**Other Services**				
	Availability ofmobile SMS facility	60	100.00	60	100.00
	Provision of Printed Information by CHC	60	100.00	60	100.00
	Availability of aggregator model facility	0	0.00	0	0.00
	Availability of on-line booking	15	25.00	12	20.00
	Availability ofother inputs	13	21.67	23	38.33
IV	**Advisory services**				
	Experts are available in CHC	60	100.00	60	100.00
	Conduct training and demonstrations	44	73.33	25	41.67
	Mobile APP is available to track working duration and total rental money of machineries	0	0.00	0	0.00

Table 3. Knowledge level of the farmers about mechanized cultivation of paddy through CHSC

n= 120

Sl. No.	Parameters	Government CHSC n= 60		Private CHSC n= 60	
		Frequency	Per cent	Frequency	Per cent
I	**Nursery**				
	Seed rate (kg\acre)	60	100.00	60	100.00
	mat type nursery trays (per acre)	60	100.00	60	100.00
	Nursery bed preparation for machine transplanting	42	70.00	17	28.33
II	**land preparation (availability, use, uasage hours, hiring charges, frequency of use)**				
	Tractor	60	100.00	60	100.00
	Power tiller	60	100.00	60	100.00
	Rotovator	60	100.00	60	100.00
	M.B. plough	60	100.00	60	100.00
	Rotary tiller	41	68.33	33	55.00
	Cultivator	60	100.00	60	100.00
	Cage wheel	60	100.00	60	100.00
III	**Plant protection**				
	Knapsack sprayer	52	86.67	52	86.67
	Gutter sprayer	43	71.67	41	68.33
	Power sprayer	28	46.67	29	48.33
	HTP sprayer	17	28.33	18	30.00
IV	**Transplanting**				
	Paddy transplanter	60	100.00	60	100.00
V	**Weeding**				
	Conoweeder	47	78.33	41	68.33
	Power operated	42	70.00	35	58.33
VI	**Harvesting**				
	Combined harvester	60	100.00	60	100.00
	Reaper	41	68.33	3	5.00
	Paddy thresher	60	100.00	60	100.00

agriculture. Agriculture requires enormouslabourers for all the agricultural operations. The shortage of labour affects the agriculture. Hence, the mechanization can act as a coping mechanism for the labour constraints.

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MARKETING BEHAVIOUR OF GRAPE GROWERS IN MAHARASHTRA STATE

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ABSTRACT

Marketing behavior of a farmer is influenced by several factors. Agriculture is India's most important economic industry. Maharashtra produces the most grapes in the country. The Maharashtra government has suggested creating an agriculture export zone that would cover Nashik, Sangli, Pune, Solapur, Satara, and Ahmednagar, with the goal of coordinating the export of table grapes and value-added products like wine. Pesticides are commonly used in agriculture to control pests. In Maharashtra, the area planted with grapes was 90000 acres in 2016-17. The annual output was estimated to be around 2048000MT. The productivity was 22.73 MT/ha. Due to over-dependence and indiscriminate use of pesticides, which produces residue problems in fruits, one of the key concerns in most nations, including India, the use of pesticides in modern agriculture techniques is one of the important methods for protecting crops from pests. The study was conducted in the Nashik district. At random, twenty-four communities were picked. Each community selected a total of 240 farmers, with ten grape growers picked from each village. Personal interviews were used to analyse the data collected. The majority of the grape farmers had age up to 35 years age received up to graduation, and higher education had Medium (10 to 12 Years) level of farming experience. Small (1.01 to 2.00 ha.) 'small' land holdings, area under grape were Too Small (Upto 1.72 ha.), annual income between Rs. 200001/- to 600000/-, were having medium sources of information for getting utilization pattern of pesticides, medium risk orientation and medium marketing behavior. In research result indicated that 67.50 per cent of respondents had a medium level of marketing behaviour, 17.09 per cent had a high level of marketing behaviour, and only 15.41 per cent had a low level of marketing behaviour. Agricultural marketing needs to be conducted within a supportive policy, legal, institutional, macro-economic, infrastructural and bureaucratic environment.

Key word- Marketing behaviour, grape growers

INTRODUCTION

According to a United Nations analysis on global population trends, India will surpass China as the world's most populous country by 2020. With 2.40 percent of land resources and 4.00 percent of water resources, India currently

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supports almost 17.84 percent of the world's population. Continuously shrinking/ arable land, slow pace of improvement of crop productivity are critical challenges to ensuring the security of food and nutrition for the nation (Mooventhan *et al*., 2020). Crop production is influenced by a number of factors. Several elements influence a farmer's marketing behaviour. In India, agriculture is the most important economic sector (Sucheta, 2019). It ensures food and income stability. Different types of soil and climate in India, which covers numerous agro-ecological areas, allow for the cultivation of a wide range of horticultural crops. Grape is one of the most delicious fruits and a powerful food. It contains a variety of essential nutrients for a healthy lifestyle. It also has significant medicinal properties and has been utilised in natural medicine for ages. The Moghul invaders introduced the grape to India about 1300 AD. India's agrochemical industries are booming, and the country is now the world's fourth largest producer of agrochemicals, trailing only the United States, Japan, and China. Pesticide usage per hectare in India is currently among the lowest in the world, at 0.6kg/ha, compared to 5-7kg/ha in the United Kingdom and 13kg/ha in China (Mooventhan *et al.,* 2020).

Maharashtra is the most productive state in the country, accounting for more than 82.56 percent of total production and the greatest productivity. It is followed by Karnataka (11.70 percent). In Nashik district, 56000 ha. area was under grape cultivation and production was 1237000MT. About 60-70 per cent of total production of seedless grapes is produced in Nashik district. Out of 15 talukas from Nashik district, 90.00 per cent of grape production is from Nashik, Niphad and Dindori talukas. Now a days, it is necessary to make aware the farmers about various international standards and good agricultural practices for production, types of certification required in international market, banned chemicals, pesticide residue, maximum permissible residue level (MRL) of respective chemicals and quality parameters. Although the use of agrochemicals has benefited agricultural production, indiscriminate use (intensive and extensive) has led to different problems, including pollution, environmental damage (contamination of water, air and soil resources), toxicity to nontarget organisms, toxicity to humans associated with the presence of agrochemical residues in food, and decreased effectiveness of the chemicals following the development of pest resistance (Aktar *et al.,* 2009; Fountain and Wratten, 2013; Kumar, 2012).

Dietary importance of grapes

Fruits are well-known for their importance in human diets. Grape fruits are high in nutrients, with 10.2% carbohydrates, 0.8% protein, 0.1 percent minerals, and 85.5 percent water. Grapes are high in vitamins and minerals. A significant amount of vitamin 'A' is present, which is also retained in dehydrated grapes. It is one of the most tasty, refreshing, and nourishing fruits available. Grape fruits that have been ripped are easily edible. Fresh grapes, raisins, juice, and wine are just some of the ways they can be consumed. Grape juice is a hydrating thirst quencher as well as a kidney stimulant and laxative. Wine is the most common product made from grapes. Grapes for table use must have a good appearance, acceptable eating quality, and good transportation and storage characteristics.

In Nashik district , Thompson Seedless, Tas-A-Ganesh , Sonaka , Manik chaman, Sharad Seedless and Flame Seedless major varieties of grape use for the cultivation. Important pests of grape are Mealy bug, Flea Beetles, Thrips and Mites. Important diseases of grape are Downy Mildew, Powdery Mildew and Anthracnose.

India is currently the largest manufacturer of essentials pesticides among the South Asian and African countries, with the exception of Japan. Nashik is well known as Grape city in Maharashtra state.

Even though grape producers have developed abilities in grape cultivation, a large number of grape growers still lack improved production technology and effective marketing management. Along with grape production, marketing management is an important function. This research will help grape growers understand the importance of different marketing behaviours, unique markets, marketing costs, and pricing spreads in the marketing channels they prefer. As a result, they will be able to choose the market and marketing channel that will give them the best price for their produce at the lowest cost, as well as implement various marketing tactics that will help them receive a better price and return from grape marketing.

MATERIAL AND METHODS

The present study was conducted in Nashik district of Maharashtra state, as it is one of the most important grape producing regions in Maharashtra state. The district's soil and climatic conditions are highly suitable for grape cultivation. Two tahsils namely Niphad and Dindori selected purposively for this study on the basis of maximum area under cultivation of grape crop. From each selected tahsil, 12 villages were selected on the basis of higher production of grape crop. Total twenty four villages were selected randomly. From each selected village 10 grape growers were selected from each village making a total sample of 240 farmers. Data is collected through field surveys, group discussions, and questionnaires. To evaluate the results, the data was collated and statistically examined using simple statistical methods such as range, frequency, and percentage. For this study, an ex-post-facto research design was used. The statements used to analyze marketing behaviour of farmers were as follows: when do you sell the produce, which mode is used for transport, reasons for selling at a particular period/ time, whom do you sell the produce, where do you sell the produce, reasons for selling at a particular place and so on. On behalf of the above, statement responses were recorded from the respondents.

RESULT AND DISCUSSION

1.1 The personal, socio-economic and psychological profile of the grape growers.

The majority of the grape growers had age up to 35 years age received up to graduation, and higher education had Medium (10 to 12 Years) level of farming experience. Small (1.01 to 2.00 ha.)'small' land holdings, area under grape were Too Small (Upto 1.72 ha.), annual income between Rs. 200001/- to 600000/ -, were having medium sources of information for getting utilization pattern of pesticides, medium risk orientation and medium marketing behavior.

2.1 Marketing Behaviour of grape growers

The Marketing behaviour included how grape growers dispose of their produce through

Table 2.1 Distribution of the respondents according to their Marketing Behaviour

Sr. No.	Marketing Behaviour	Respondents (N=240)	
		Frequency	Percentage
1	Low(Upto 47)	37	15.41
2	Medium (48 to58)	161	67.50
3	High (59 and above)	42	17.09
	Total	240	100.00
	Maximum : 69	Minimum : 36	

Table 2.2 Detail distribution of the respondents according to their Marketing Behaviour

Sr. No.	Marketing Behaviour	Frequency	Percentage
I.	**Pruning time followed**		
A.	**Summer Pruning**		
i.	March	54	22.50
ii.	April	142	59.16
iii.	May	44	18.34
B)	**Winter Pruning**		
i.	September	154	64.16
ii.	October	42	17.50
iii.	November	44	18.34
II.	**When do you sell the produce?**		
1.	Immediately after the harvest	240	100.00
2.	After 5 to 10 days of harvest by storing	15	6.25
III.	**Reasons for selling of grape**		
1.	Highly perishable	240	100.00
2.	Monetary requirement	240	100.00
IV.	**Constraints in selling at a particular period**		
1.	No storage structure available for storage	202	84.16
2.	Harvesting cannot be delayed because of over maturity and crop loss risk by unseasonal rains.	240	100.00
V.	**Whom do you sell the produce?**		
1.	To village level trader	85	35.41

2.	To wholesalers through commission agent in the regular market yard	50	20.84
3.	To the trader through the Co-op Society.	75	31.25
4.	Export Companies	122	50.83
5.	Farmer Producer Organization	28	11.66
6.	By Self (Export)	15	6.25
VI.	**Reasons to sell for a particular agency**		
1.	The agency is very nearer one	189	78.75
2.	The agency is worthy credit	201	8.75
3.	I have no time to engage myself in selling directly to consumers	79	32.91
4.	Immediate cash payment	201	83.75
5.	Previous agreement	176	73.33
6.	Better price	186	77.50
VII.	**Where do you sell**		
1.	Local	130	54.16
2.	Export	110	45.84
VIII.	**Reasons for selling at a particular place.**		
1.	Market is very near to place	193	80.41
2.	The better transport facilities available in the market	188	78.33
3.	Better price are available in the market	240	100.00
4.	Better infrastructure facilities are available	201	98.52

*Multiple responses

various marketing aspects like storage, grading, packaging, and transport. The data about marketing behaviour is presented in Table 1.

Table 1 shows that 67.50 per cent of respondents had a medium level of marketing behaviour, 17.09 per cent had a high level of marketing behaviour, and only 15.41 per cent had a low level of marketing behaviour.

The data presented in the Table 2 revealed that 59.16 per cent of the grape growers followed the summer pruning pattern in April and 64.16 per cent of the grape growers followed the winter pruning pattern in October, Regarding sell the produce cent per cent (100.00 %) of the grape growers sold grapes immediately after the harvest. Reasons for selling grapes were it is highly perishable (100.00 %) and monitory requirement (100.000 %). Constraints in marketing at a particular period of grape growers' marketing behaviour were no storage structure available for storage (84.16 %), and harvesting cannot be delayed because of over maturity and crop loss risk unseasonal rains (100.00 %).

Nearly (50.83 %) of the grape growers sold grape to grape consultants, followed by 35.41 per cent to village level trader, 31.25 per cent and 20.84 per cent are To the trader through the Co-op Society and to wholesalers through commission agent in the regular market yard.

Reasons to sell for a particular agency of grape growers were immediate cash payment (83.75 %), the agency was very nearer one (78.75 %), better price (77.50 %), previous agreement 73.33 per cent, no time to engage me in selling directly to consumers (32.91 %) and the agency is worthy credit (8.75 %). Furthermore (100.00 %) of the respondents were followed by better infrastructure facilities were available (98.52 %). The grape growers sold the grapes. Concerning sold grape at a particular place, the market is very near to place (80.41 %), the better transport facilities available in the market (78.33 %) and majority 54.16 per cent of the grape growers were export and 45.84 per cent were sold at the local level.

The majority of respondents agree that transportation is critical to agricultural product marketing. As a result, road transport plays an important part in the distribution of agricultural products, as it is the primary mode of carrying agricultural goods from fields.

CONCLUSION

It was concluded that 67.50 percent of the farmers had medium level of marketing behaviour followed by 17.09 percent of the respondents had high level of marketing behaviour and only 15.41 percent of respondent had low level of marketing behaviour. Government should give fair deal in establishing markets at the village level and dissemination of latest market information to the farmers in the right time. Establishing cold storage and processing units at the village level in order avoid price fluctuation. Arrange adequate and timely transport facilities for the smooth moment of grape growers from the palace of production to market. These measures which may help not only to improve efficiency of marketing grape growers but also increase the producer share in the consumer rupee. This can be achieved by employing scientific supply chain management techniques. As a result, more effective on-the-ground efforts by agricultural universities and departments should be made through providing accurate information. Hence, it is imperative to focus on the marketing behaviour of grape farmers while designing appropriate strategies with training programmes and demonstrations to strengthen their marketing behaviour.

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RESOURCE AVAILABILITY AND THEIR EXTENT OF ADOPTION BY THE DRY FARMERSIN CENTRAL DRY ZONE OF KARNATAKA

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ABSTRACT

This survey was carried out in the central dry zone of Karnataka during 2019-20. Here an attempt has been made to realise the availability status of resources and their extent of adoption by the dry farmers. Along with that, gap between the availability and adoption of the resources was measured. The primary data was collected from the 250 dry farmers sampled by employing the multi-stage random sampling technique. The results disclosed that the 'sprinkler irrigation system' and the 'agricultural labour' were the most and least timely & adequately available resources respectively. In case of adoption, the 'quality fertilizers' was found to have the most full scale adoption. Whereas, the 'vermicompost' was found to have the least full scale adoption. In case of the availability-adoption gap, the 'sprinkler irrigation system' showed wide gap and the gap was least with the 'agricultural labour'.

Key words: Resources, adoption, availability-adoption gap and central dry zone.

INTRODUCTION

The agricultural resources are the most essential inputs which are getting degrading day-by-day (www.suez.com). These resource might be natural or manufactured without them it would be very difficult to get the expected yield. As we all know that the available agricultural land is static and which cannot be expanded anymore, the availability of the resources matters a lot in getting good yield from any land. That to in dry farming situation, the scenario is very different and the scarcity is comparatively very high (Reddy and Reddy, 2015). Hence the idea of adequacy and timely availability of these resources along with the gap between their availability and adoptionis very crucial to make production plans to use locally available resources in an efficient way.Hence this study has been framed to understand the timely availability and the adequacy of resources in the study area.

MATERIAL AND METHODS

The survey was conducted in the central dry zone of Karnataka state by collecting primary data from 250 dry farmers. The multi-stage

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random sampling technique was employed to sample the respondents. The 14 essential resources of farming activities were listed with the help of review of literature and the advice from the experts. The different listed resources were quality seeds of draught resistant varieties, quality fertilizers, quality agro-chemicals, credit supply, crop insurance, ground water, markets accessibility, information (production & marketing), agricultural labour, FYM, vermicompost, drip irrigation system, sprinkler irrigation system and farm pond.

The interview schedule was used as data collection tool. To find the timely availability and adequacy status of the resources, each listed resource was given with four responses viz., 'timely available and adequate', 'timely available but inadequate', 'Timely not available but adequate' and 'Timely not available and inadequate'. Whereas, to find the extent of adoption of the same resources, each listed resource was given with three responses viz., 'adopted on a full scale', 'partially adopted' and 'not adopted'. The frequency and percentage methods were used for the calculation purpose.

RESULTS AND DISSCUSSION

Here the source of availability was not only the Karnataka State Department of Karnataka (KSDA). Even from all other possible sources (public and private service providers like other allied departments of agriculture, private input dealers, contract farming companies, agricultural non-government organizations) of agricultural inputs were considered. After the analysis of data, obtained results were given as follows

1. Quality seeds of draught resistant varieties: Majority (70.00 %) of the dry farmers reported quality seeds of draught resistant varieties as 'timely available and adequate'. Whereas, remaining few (30.00 %) of them were reported as 'timely available but inadequate'. But none of them reported as 'timely not available but adequate' and 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the quality seeds of draught resistant varieties, almost three-fifth (59.60 %) of the dry farmers reported as they were 'adopted on a full scale'. Followed by two-fifth (40.40 %) of them reported as they were 'partially adopted'. But none of them reported as they were 'not adopted' (Table 2 and Fig. 2).

2. Quality fertilizers: Half (51.20 %) of the dry farmers reported quality fertilizers as 'timely available but inadequate'. Remaining half (48.80 %) of them reported as 'timely available and adequate'. But none of them reported as 'timely not available but adequate' and 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the quality fertilizers, three-fourth (76.00 %) of the dry farmers reported as they were 'adopted on a full scale'. Followed by almost one-fourth (24.00 %) of them reported as they were 'partially adopted'. But none of them reported as they were 'not adopted' (Table 2 and Fig. 2).

3. Quality agro-chemicals: More than three-fifth (63.60 %) of the dry farmers reported quality agro-chemicals as 'timely available and adequate'. Followed by one-fourth (25.20 %) of them reported as 'timely available but inadequate'. Whereas, remaining few (11.20 %) of them reported as 'timely not available but

adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the quality agro-chemicals, more than half (55.60 %) of the dry farmers reported as they were 'adopted on a full scale'. Whereas, remaining less than half (44.40 %) of them reported as they were 'partially adopted'. But none of them reported as they were 'not adopted' (Table 2 and Fig. 2).

4. Credit supply: More than half (55.20 %) of the dry farmers reported credit supply as 'timely available and adequate'. Followed by exactly equal percentage of the dry farmers *i.e.,* 22.40 per cent were reportedas 'timely available but inadequate 'and 'timely not available but adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the credit supply facilities, more than two-fifth (44.40 %) of the dry farmers reported as they were 'adopted on a full scale'. Followed by almost one-third (31.20 %) of them reported as 'partially adopted'. Whereas, remaining one-fourth (24.40 %) of them reported as they were 'not adopted' (Table 2 and Fig. 2).

5. Crop insurance: More than half (53.60 %) of the dry farmers reported crop insurance facility as 'timely available but inadequate'. Followed by more than two-fifth (41.60 %) of them reported as 'timely available and adequate'. Whereas, remaining few (4.80 %) of them reported as 'timely not available but adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the crop insurance facility, more than one-third (36.00 %) of the dry farmers reported as they were 'partially adopted. Followed by exactly one-third (33.60 %) of them reported as they were 'adopted on a full scale'. Whereas, remaining few (30.40 %) of them reported as they were 'not adopted' (Table 2 and Fig. 2).

6. Ground water: Two-fifth (40.80 %) of the respondents reported ground water as 'timely available but inadequate'. Followed by one-third (34.40 %) of them reported as 'timely available and adequate'. Almost one-fifth (19.20 %) of them reported as 'timely not available but adequate'. Whereas, remaining few (5.60 %) of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the bore wells, almost two-third (64.40 %) of the dry farmers reported as they were 'adopted on a full scale'. Followed by 17.60 per cent of them reported as they were 'partially adopted'. Whereas, remaining 18.00 per cent of them reported as they were 'not adopted' (Table 2 and Fig. 2).

7. Markets accessibility: More than three-fourth (76.80 %) of the dry farmers said markets accessibility as 'timely available and adequate'. Whereas, remaining one-fourth of them distributed among 'timely available but inadequate' (20.40 %) and 'timely not available but adequate' (2.80 %) categories. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the markets facilities, exactly half (50.00 %) of the dry farmers reported as they were 'partially

adopted'. Followed by more than two-fifth (44.40 %) of them reported as they were 'adopted on a full scale'. Whereas, remaining few (5.60 %) of them reported as they were 'not adopted' (Table 2 and Fig. 2).

8. Information (Production & marketing): Almost half (48.00 %) of the dry farmers reported information (production & marketing) availability as 'timely available and adequate'. Followed by two-fifth (38.00 %) of them reported as 'timely available but inadequate'. Whereas, remaining few (14.00 %) of them reported as 'timely not available but adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the information (production & marketing) facilities, more than four-fifth (83.60 %) of the dry farmers reported as they were 'partially adopted'. Whereas, remaining few (16.40 %) of them were reported as they were 'adopted on a full scale'. But none of them reported as they were 'not adopted' (Table 2 and Fig. 2).

9. Agricultural labour: Half (51.20 %) of the dry farmers reported agricultural labours as 'timely available but inadequate'. Followed by two-fifth (40.80 %) of them reported as 'timely not available but adequate'. Whereas, remaining few (8.00 %) of them reported as 'timely available and adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the agricultural labours, more than half (52.80 %) of the dry farmers reported as they were 'adopted on a full scale'. Whereas, remaining less than half (47.20 %) of them reported as they were 'partially adopted'. But none of them reported as they were 'not adopted' (Table 2 and Fig. 2).

10. Farm Yard Manure: Almost half (47.60 %) of the dry farmers reported FYM as 'timely available and adequate'. Followed by more than two-fifth (45.20 %) of them reported as 'timely available but inadequate'. Whereas, remaining few (7.20 %) of them reported as 'timely not available but adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the FYM, almost three-fourth (73.60 %) of the dry farmers reported as they were 'adopted on a full scale'. Whereas, remaining one-fourth (26.40 %) of them reported that they were 'partially adopted'. But none of them reported as they were 'not adopted' (Table 2 and Fig. 2).

11. Vermicompost: Half (51.60 %) of the dry farmers reported vermicompost as 'timely available but inadequate'. Followed by two-fifth (40.40 %) of them reported as 'timely available and adequate'. Whereas, remaining few (8.00 %) of them reported as 'timely not available but adequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the vermicompost, two-third (68.40 %) of the dry farmers reported as they were 'not adopted'. Followed by exactly one-fifth (20.00 %) of them reported as they were 'partially adopted'. Whereas, remaining few (11.60 %) of them reported as they were 'adopted on full scale' (Table 2 and Fig. 2).

12. Drip irrigation system: Great majority (93.20 %) of the dry farmers reported drip irrigation system as 'timely available and adequate'. Whereas, remaining very few (6.80 %) of them reported as 'timely available but inadequate'. But none of them reported as 'timely not available but adequate' and 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the drip irrigation system, majority (46.80 %) of the dry farmers were found to be 'adopted on a full scale'. Followed by two-fifth (41.20 %) of them were found to be 'not adopted'. Whereas, remaining few (12.00 %) were found to be 'partially adopted' (Table 2 and Fig. 2).

13. Sprinkler irrigation system: Great majority (96.00 %) of the dry farmers expressed sprinkler irrigation system as 'timely available and adequate'. Whereas, remaining very few (4.00 %) of them expressed as 'timely available but inadequate'. But none of them expressed as 'timely not available but adequate' and 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the sprinkler irrigation system, three-fifth (62.80 %) of the dry farmers were found to be 'not adopted'. Followed by one-third (35.20 %) of them were found to be 'adopted on full scale'. Whereas, remaining very few (2.00 %) were found to be 'partially adopted' (Table 2 and Fig. 2).

14. Farm pond: More than half (52.00 %) of the dry farmers reported farm ponds as 'timely available and adequate'. Followed by almost one-third (32.00 %) of them reported as 'timely not available but adequate'. Whereas, remaining few (16.00 %) of them reported as 'timely available but inadequate'. But none of them reported as 'timely not available and inadequate' (Table 1 and Fig. 1).

In case of extent of adoption of the farm ponds, three-fifth (62.80 %) of the dry farmers were found to be 'not adopted'. Followed by few (28.80 %) of them were found to be 'adopted on full scale'. Whereas, remaining very few (8.40 %) were found to be 'partially adopted' (Table 2 and Fig. 2).

Further ranking of the resources was made w.r.t. their availability. Where the Sprinkler irrigation system conquered the first position by getting expressed by 96.00 per cent of the dry farmers as 'timely available & adequate'. Followed by drip irrigation system (93.20 %), markets accessibility (76.80 %), quality seeds of draught resistant varieties (70.00 %), quality agro-chemicals (63.60 %), credit supply (55.20 %), farm pond (52.00 %), quality fertilizers (48.80 %), information (production & marketing) (48.00 %), FYM (47.60 %), crop insurance (41.60 %), vermicompost (40.40 %), ground water (34.40 %) and the last position was taken by the agricultural labour by getting expression as 'timely available & adequate' by only 8.00 per cent of the dry farmers (Table 3).

Whereas the ranking of the same resources was done w.r.t. their extent of adoption (full scaleadoption). The first position was occupied by the quality fertilizers by getting full scale adoption by three-fourth (76.00 %) of the dry farmers. Followed by FYM (73.60 %), bore wells (64.40 %), quality seeds of draught resistant varieties (59.60 %), quality agro-chemicals (55.60 %), agricultural labour (52.80 %), drip irrigation system (46.80 %), credit supply

(44.40 %), markets accessibility (44.40 %), sprinkler irrigation system (35.20 %), crop insurance (33.60 %), farm pond (28.80 %), information (production & marketing) (16.40 %) and the last rank was taken by the vermicompost by getting adoption by only 11.60 per cent of the dry farmers (Table 3).

The ranking of the resources was made by calculating the gap between their 'adequate and timely availability' and their 'full scale adoption' by the dry farmers. The sprinkler irrigation system conquered first position among all with wide gap of 60.80 per cent. Followed by drip irrigation system (46.40 %), markets accessibility (32.40 %), information (production & marketing) (31.60 %), vermicompost (28.80 %), farm pond (23.20 %), credit supply (10.80 %), quality seeds of draught resistant varieties (10.40 %), quality agro-chemicals (8.00 %) & crop insurance (8.00 %), FYM (-26.00 %), quality fertilizers (-27.20 %), ground water (-30.00 %) and the last position was gained by agricultural labour (-44.80 %) (Table 4).

Here the sprinkler irrigation system gained first position by getting the highest adoption gap. Where, among the 96.00 per cent of the farmers who reported it as 'timely available and adequate', only 35.20 per cent were adopted it on full scale and the remaining 60.80 per cent were either partially adopted or not adopted. Same way it happened with other resources. But the case of agricultural labour, ground water and quality fertilizers it was reverse case and got negative values. Means even though these three resources were reported as 'timely available and adequate' by the less percentage of respondents (8.00 %, 34.40 and 48.80 % respectively), the higher percentage of respondents were adopted them on a full scale (52.80 %, 64.40 % and 76.00 % respectively). This might be due to the high felt need of these resources compare to all other resources.

CONCLUSION

Overall, 'sprinkler irrigation system' 'drip irrigation system' were found to be the most adequately and timely available resources. This might be due to the availability of these resource in KSDA with subsidy. In terms of full scale adoption, 'Quality fertilizers' and 'FYM' were at first two position. This might be due to the convenience and cost involved in these two resources. As the fertilisers are the most convenient easy to apply in the field along with their well proven results, they were adopted by most of the dry farmers. Also most of the farmers depend on dairy for sustainable income, FYM is available at home even though not in adequate quantity and hence adopted on full scale by most of the dry farmers.

The availability and adoption gap gave a surprised results that the gap was found to be highest in case of sprinkler and drip irrigation systems even though sufficient promotional efforts from KSDA and other line departments. Whereas in case of agricultural labour, ground water, quality fertilizers and FYM the gap was least and it was negative. That means, more dry farmers adopted these resources on full scale even though they were either not available in time or inadequate. This might be due to the realisation of these resources' necessity. Hence any successful effort to realise the end user about the benefits would yield better adoption.

Table 1 Resource availability status of central dry zone of Karnataka

Sl. No.	Resources	Availability							
		Timely available and adequate		Timely available but inadequate		Timely not available but adequate		Timely not available and inadequate	
		F	%	F	%	F	%	F	%
1	Quality seeds of draught resistant varieties	175	70.00	75	30.00	0	0.00	0	0.00
2	Quality fertilizers	122	48.80	128	51.20	0	0.00	0	0.00
3	Quality agro-chemicals	159	63.60	63	25.20	28	11.20	0	0.00
4	Credit supply	138	55.20	56	22.40	56	22.40	0	0.00
5	Crop insurance	104	41.60	134	53.60	12	4.80	0	0.00
6	Ground water	86	34.40	102	40.80	48	19.20	14	5.60
7	Markets accessibility	192	76.80	51	20.40	7	2.80	0	0.00
8	Information (Production & marketing)	120	48.00	95	38.00	35	14.00	0	0.00
9	Agricultural labour	20	8.00	128	51.20	102	40.80	0	0.00
10	FYM	119	47.60	113	45.20	18	7.20	0	0.00
11	Vermicompost	101	40.40	129	51.60	20	8.00	0	0.00
12	Drip irrigation system	233	93.20	17	6.80	0	0.00	0	0.00
13	Sprinkler irrigation system	240	96.00	10	4.00	0	0.00	0	0.00
14	Farm pond	130	52.00	40	16.00	80	32.00	0	0.00
		N=250							

Table 2 Extent of adoption of available resources by the dry farmers in central dry zone of Karnataka

Sl. No.	Resources	Extent of adoption					
		Adopted on a full scale		Partially adopted		Not adopted	
		F	%	F	%	F	%
1	Quality seeds of draught resistant varieties	149	59.60	101	40.40	0	0.00
2	Quality fertilizers	190	76.00	60	24.00	0	0.00
3	Quality agro-chemicals	139	55.60	111	44.40	0	0.00
4	Credit supply	111	44.40	78	31.20	61	24.40
5	Crop insurance	84	33.60	90	36.00	76	30.40
6	Bore wells	161	64.40	44	17.60	45	18.00
7	Markets accessibility	111	44.40	125	50.00	14	5.60
8	Information (Production & marketing)	41	16.40	209	83.60	0	0.00
9	Agricultural labour	132	52.80	118	47.20	0	0.00
10	FYM	184	73.60	66	26.40	0	0.00
11	Vermicompost	29	11.60	50	20.00	171	68.40
12	Drip irrigation system	117	46.80	30	12.00	103	41.20
13	Sprinkler irrigation system	88	35.20	5	2.00	157	62.80
14	Farm pond	72	28.80	21	8.40	157	62.80
		N=250					

Table 3 Ranking of the resources in central dry zone of Karnataka w.r.t. their availability and extent of adoption

Sl. No.	Resources	Status of availability (timely available & adequate)			Status of extent of adoption (adopted on a full scale)		
		F	%	Rank	F	%	Rank
1	Quality seeds of draught resistant varieties	175	70.00	IV	149	59.60	IV
2	Quality fertilizers	122	48.80	VIII	190	76.00	**I**
3	Quality agro-chemicals	159	63.60	V	139	55.60	V
4	Credit supply	138	55.20	VI	111	44.40	VIII
5	Crop insurance	104	41.60	XI	84	33.60	X
6	Ground water	86	34.40	XIII	161	64.40	III
7	Markets accessibility	192	76.80	III	111	44.40	VIII
8	Information (Production & marketing)	120	48.00	IX	41	16.40	XII
9	Agricultural labour	20	8.00	**XIV**	132	52.80	VI
10	FYM	119	47.60	X	184	73.60	II
11	Vermicompost	101	40.40	XII	29	11.60	**XIII**
12	Drip irrigation system	233	93.20	II	117	46.80	VII
13	Sprinkler irrigation system	240	96.00	**I**	88	35.20	IX
14	Farm pond	130	52.00	VII	72	28.80	XI
		N=250					

Table 4.60 Availability and adoption gap of the resources in the central dry zone

Sl. No.	Resources	Timely available and adequate	Adopted on a full scale	Availability and adoption gap	Rank
		%	%	%	
1	Quality seeds of draught resistant varieties	70.00	59.60	10.40	VIII
2	Quality fertilizers	48.80	76.00	-27.20	XI
3	Quality agro-chemicals	63.60	55.60	8.00	IX
4	Credit supply	55.20	44.40	10.80	VII
5	Crop insurance	41.60	33.60	8.00	IX
6	Ground water	34.40	64.40	-30.00	XII
7	Markets accessibility	76.80	44.40	32.40	III
8	Information (Production & marketing)	48.00	16.40	31.60	IV
9	Agricultural labour	8.00	52.80	-44.80	**XIII**
10	FYM	47.60	73.60	-26.00	X
11	Vermicompost	40.40	11.60	28.80	V
12	Drip irrigation system	93.20	46.80	46.40	II
13	Sprinkler irrigation system	96.00	35.20	60.80	**I**
14	Farm pond	52.00	28.80	23.20	VI
		N=250			

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SOCIAL MEDIA USAGE THROUGH ICT APPLICATION AMONG UNDER GRADUATE STUDENTS

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ABSTRACT

The present study was undertaken with the purpose to investigate the behaviour of social media usage among the undergraduate students of Kohima college. The sample consisted of 165 students of which 69% were girls. Usage of social media found to fall under medium usage category. Whatsapp (26.85%) was most popularly used, followed by Youtube (25.86%), Instagram (19.93) and facebook (15.32%) among the students. The findings indicated that there is no significant correlation between the time spend on social media and its adoption among the students. It also found that the main reasons for using social media were for obtaining new information, to facilitate in college works and share good practices with others.

Key Words: Social media, Under graduate, Media adoption, Media impact.

INTRODUCTION

Advancement in Information and Communication Technologies (ICT) has made communication easier for individual and families to stay connected. A major change that is taking place is the social networking advancement of the internet which is transforming the world into a virtual global village. Social network means a set of people connected by a set of social relationships, such as friendship, co-working or information exchange (Garton *et. al*. 1997). When we refer to social media, applications such as Facebook, WhatsApp, Twitter, YouTube, LinkedIn, Pinterest, and Instagram often come to mind. These applications are driven by user-generated content, and are highly influential in a myriad of settings (Greenwood and Gopal, 2015). According to Lenhart *et. al* (2010) 45% of college students use social media sites at least once a day and 72% of them have a social media profile. The students' attitude towards the use of social networking sites also shows a permanent change in the way the students interact and socialize (Salih & Elsaid., 2018). Usage of social media for educational purposes also have positive relation to academic performance (Boahene *et.al.,* 2019). Among the social media platforms, Facebook is very popular among youngsters and research shows that anywhere between 85 and 99 percent of college students use Facebook (Hargittai, 2007).

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In a study carried out by Bhakta (2017) the result showed that most of the students used WhatsApp and Social Network Sites (SNS) through their mobile/tablet for entertainment purpose. It also revealed that Social Networking Sites had both positive and negative impacts on college students. Irfan and Dhimmar (2019) revealed that communication through WhatsApp has enhanced effective flow of information, idea sharing and connection among people. Chowdhury (2019) stated that Students and teenagers of the twentieth century are more digitally oriented. YouTube became a basic platform for sharing information and an easy tool of learning. Students upload and watch videos of different fields and learn different things from the tutorials and tend to create their own sites. Based on the above findings by various researchers, it was proposed to study the social media usage behaviour by under-graduate students of kohima college with the following objectives.

Objective of the study

1. To study the time spent on social media by the undergraduate students with respect to their gender.
2. To study the correlation between time spent on social media and its adoption among the students.
3. To identify the social media platforms used by the students.
4. To study the reasons for using social media platform.
5. To study the impact of social media among the undergraduate students based on gender.

Hypothesis

1. Ho_1: There is no significant correlation between time spent on social media and its adoption among the students
2. $H o_2$: There is no significant impact of social media between boy and girls

MATERIAL AND METHODS

i) Method

The research design was based on descriptive survey. The questionnaires were structured in Google form to understand the social media app and various platforms used by the under graduate students. The link was forwarded through whatsApp as snowball sampling technique (Naderifar *et. al.* 2017) to different groups of students. The link was disabled after a week of circulation.

ii) Study Sample

Under graduate students of Kohima College Kohima belonging to the 1st, 3rd and 5th Sem were identified as the sample population. The link was circulated to 220 students. However, only 165 students submitted the online form before the dateline of the survey.

iii) Data collection and Analysis.

The questionnaires were framed keeping the social media usage behaviour of the students. Different pattern of questions were used like the Likert scale of 1-5 (varying from Strongly Disagree (SD) to Strongly Agree (SA). The study was done during Sept 2021 and the collected data from the responses were electronically transferred into excel spread sheet and analysed using different statistical methods like percentage, mean, standard deviation Pearson's correlation coefficient and t-test.

Table 1: Profile of the under graduate students based on semester. (N=165)

Gender	N	Semester		
		1st	3rd	5th
Male	51 (30.9)	32 (19.4)	13 (7.88)	6 (3.64)
Female	114 (69.1)	63 (38.19)	26 (15.76)	25 (15.16)
Total	165 (100)	95 (57.58)	39 (23.64)	31 (18.79)

*Numbers under parenthesis indicates percentage.

Table 2: Time spend on social media between genders. (N=165)

Time spend	Male	Female	Total
Less than 30 minutes	5 (3.04)	5 (3.04)	10 (6.07)
30-60 minutes	13 (7.88)	26 (15.76)	39 (23.64)
60-90 minutes	10 (6.07)	30 (18.19)	40 (24.25)
90-120 minutes	11 (6.67)	24 (14.55)	35 (21.22)
More than 120 minutes	12 (7.28)	29 (17.58)	41 (24.85)
Total	51 (30.91)	114 (69.1)	165 (100)

*Numbers under parenthesis indicates percentage.

RESULTS AND DISCUSSION

It is evident from table 1 that out of 165 students, 114 students i.e, 69.1 % were girls and 51 students i.e 30.9% were boys who responded to the questionnaire. It also revealed that 57.58 percent were represented from 1st semester while the least responses was 18.79 percent from 5th Semester among the under graduate students. A response rate of 75% was achieved from the total invitee.

The behaviour of students spending time on social media (Table 2) reveals that more than one third (32.13 %) of the girls spend more than 90 minutes of their time in social media platform while in the case of boys students it was found to be 13.95 percent only.

Students ability to adopt to various social media platforms and use them on a daily basis were assessed and categorised based on their adoption (Table 3). It was found that the students had a medium level of adoption (78.79%) while 13.34 percent and 7.88 percent fall under high and low level of adoption, respectively. Different social media platforms (Figure 1) used by the students indicates whatsapp (26.85%) to be most popular, followed by Youtube (25.86%),

Table 3: Percentage of under graduate students across various level of social media adoption.

Level of adoption	Social media usage	
	N	%
High (score above 1.58)	22	13.34
Medium (score between 1.58-1.26)	130	78.79
Low (score below 1.26)	13	7.88

X=1.42, σ = 0.16

Instagram (19.93) and Facebook (15.32%) respectively.

From the Table 4, it reveals that there is no significant correlation between time spent on social media and its adoption among the undergraduate students. Thus the null hypothesis Ho_1: "There is no significant correlation between time spend on social media and its adoption among the students" is accepted.

Reasons for using social media are depicted in Table 5. It is found that the main three reasons for which the students used social media were for obtaining new information, to facilitate in college works and to share good practice with others in descending order. Whereas, finding new friends in social media platform was given the least important reason.

The Impact of social media on gender (Table 6) revealed that only one statement i.e. "Found myself saying 'just a few more minutes' when using social media" was found to be significant (P<.05) between the genders, thus our hypothesis Ho_2: 'There is no significant impact of social media between boy and girls' stands rejected for this particular statement. However,

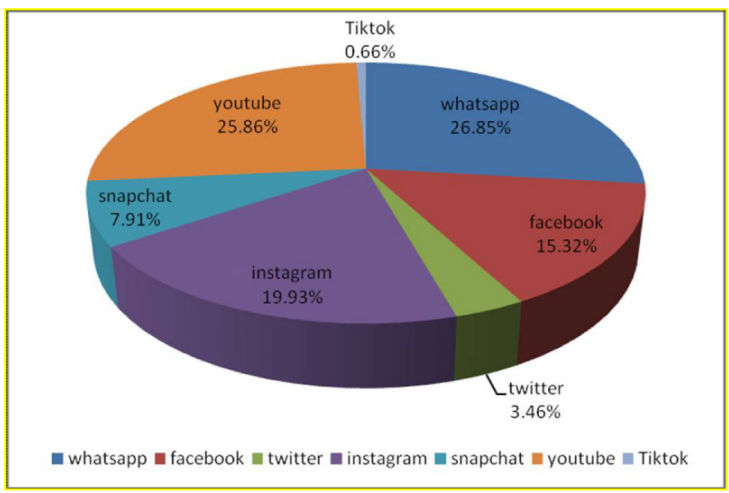

Figure 1: Different social media platform used by students

Table 4: Correlation between time spend on social media and adoption among the students.

Variable	Adoption
Time spent	$R = 0.116^{NS}$

NS=Not significant.

with respect to the other statements viz. 'Investing more time on social media' ($t=1.97^{NS}$), 'Providing first priority to social media before doing anything'($t= 1.97^{NS}$), 'Feeling academic productivity suffers because of social media' ($t=1.97^{NS}$), 'Curtail down the time spend on social media but failed' ($t= 2.00^{NS}$), 'People give negative comments on my social media usage' ($t=1.97^{NS}$) and 'I feel stressed out due to use of social media' ($t=1.97^{NS}$), it is indicated in the table that no significant difference is found between boys and girls. Thus the hypothesis Ho_2: There is no significant impact of social media between boys and girls stands accepted for these six statements.

DISCUSSION

The study was undertaken with the aim to understand the social media usage by the undergraduate students of Kohima College. For this Google form questionnaires were prepared and circulated through whatsApp group of the college to which 165 students responded. The data revealed that girls accounted for 69.1 % of the respondents. Girls (32.13%) were also found to spend more time on social media platform (more than 90 minutes). Ali. *et. el. (*2021) while studying the social media usage among college students found that Boys mainly use social media for communication and interaction, while girls use social networking sites for educational purposes. The finding from this study also reveals that the adoption level of social media among the students to be that of medium adoption category (78.79%). The time spend on social media and its adoption by the students is found to be not significantly correlated ($r = 0.116^{NS}$) The most popular choice of social media usage among the students is identified to be Whatsapp (26.85%)

Table 5: Reasons for using social media.

Reasons	N	Mean	Rank
In order to obtain new information	163	0.99	I
To keep contact with family members	153	0.92	V
To keep contact with friends	154	0.93	IV
To facilitate in college activities	161	0.97	II
Chatting with friends	143	0.86	VI
To find new friends	90	0.54	VII
To share good practices with others	157	0.95	III

Table 6: Impact of social media based on gender.

Statement	Gender	Mean	SD	t-value
Investing more time on social media	Male	2.86	0.89	
	Female	3.18	0.82	1.97^{NS}
Providing first priority to social media before doing anything	Male	2.88	0.97	
	Female	2.93	0.77	1.97^{NS}
Feeling academic productivity suffers because of social media	Male	2.76	1.01	1.97^{NS}
	Female	2.70	0.98	
Curtail down the time spend on social media but failed	Male	2.58	1.02	
	Female	2.69	1.08	2.00^{NS}
Found myself saying "just a few more minutes" when using social media	Male	2.74	1.11	1.97*
	Female	3.16	0.88	
People give negative comments on my social media usage	Male	2.11	1.09	1.97^{NS}
	Female	1.85	1.02	
I feel stressed out due to use of social media	Male	2.09	1.11	
	Female	2.19	1.04	1.97^{NS}

*significant at .05 level

followed by Youtube (25.86%), Instagram (19.93) and facebook (15.32%) respectively. Similar findings of student's attitude towards social media applications were also reported by Ahmad (2020) and Kant (2018). The study also found that the main reasons for using social media among the students were for obtaining new information, to facilitate in college works and share good practices with others. It also revealed that there exists a significant difference between the genders in respect to the statement that "Found myself saying 'just a few more minutes' when using social media. Celestine and Ogwueleka (2018) found that the gender of the students has no impact on the usage and activities of social media.

CONCLUSION

The study shows that social media does not differentiate learning behaviour based on genders. It does not indicate the relation between the duration of time spent on using social media application and for its adoption by the students. Social media platform (whatsApp, youtube etc) mostly used by the students can be utilized to its full potential by disseminating learning material, infotainment, video clipping through this medium and also explore the potential of the individual students.

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A STUDY ON RBKS FUNCTIONARIES IN MADANAPALLI DIVISION OF CHITTOOR DISTRICT

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ABSTRACT

In India, the Agricultural extension system is profoundly dynamic in nature and reforming at ages in order to serve the farming community in a better and effective way. As a new extension reform, Government of Andhra Pradesh has launched Rythu Bharosa Kendras (RBKs) for bringing the extension system nearer to the farming community. As RBKs are operating at village level there is a need to study the functioning of RBKs and problems identified by the extension functionaries. The study was conducted in Madanapalli division of Chittoor district with 95 number of respondents. The data regarding perception of RBK in-charges about capacity building programmes and difficulties faced by RBK in-charges in implementation of programmes was collected. The respondents were highly satisfied with the training programmes on integrated pest and disease management in paddy (94.74%) and also expressed their difficulty of not getting the inputs in time at their respective centres (77.89%). Providing need based training programmes to the RBK in-chargers and also rectifying the difficulties faced by the in-chargers in implementing the programmes with the extended support from the extension system of ANGRAU and Government of A.P will fortify the new extension reform.

Keywords: RBK, DAATTC, Training, Andhra Pradesh

INTRODUCTION

The Government of Andhra Pradesh has launched Rythu Bharosa Kendras on 30thMay,2020 in order to bring more transparency and ensure quality of services to the rural and farming community. These centres offer services like delivery of inputs to farmers within 24-48 hours of ordering through kiosks, custom hiring of machinery, technical advisories at respective centres itself. It is a decent attempt made by the government of Andhra Pradesh to bring the agriculture extension system more closely to the farmers.RBK Centres are operated by Village Agricultural Assistants/Horticulture Assistant/ Sericulture Assistant and Village Animal Husbandry Assistant/Village Fisheries Assistant at village level. As it is one of its kinds in agricultural extension reforms which is currently operating in Andhra Pradesh state alone there is a need for assessment and impact studies for further strengthening and stabilizing the

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extension system for the benefit of farmers in effective way.

MATERIALS AND METHODS

A study was conducted by the scientists' team of District Agricultural Advisory and Transfer of Technology Centre, Chittoor regarding the functioning of RBK functionaries. The team members collected information from RBK in-charges regarding perception of capacity building programmes they had undergone and difficulties faced by RBK in-charges in implementation of programmes through semi structured interview schedule. Respondents for the study were selected purposively andthe number of respondents from each mandal is given below.

RESULTS AND DISCUSSION

From Table 1.the results showed that the RBK in-charges of Madanapalli division had perception percentage ranging from 94.74 to 78.95 towards the training programmes conducted by DAATT centre, Chittoor. The respondents were highly satisfied with the training programmes on integrated pest and disease management in paddy (94.74%), nutrient management in field crops and horticultural crops (93.68%), training programme on inter-crops and trap crops (93.68%) and integrated nutrient management in groundnut (92.63%) followed by medium satisfaction regarding training programmes on seed treatment in groundnut and maize (87.37%), fertilizer management in ratoon sugarcane (87.37%), best management practices to be followed in major crops (85.26%), ICTs for agricultural development (85.26%), IPM practices in groundnut and tomato (84.21%), IPM practices in redgram (84.21%), awareness on new varieties, marketing and value addition (84.21%), human resource development and management (84.21%), importance of green manures (82.11%) and Management of Fall Armyworm in Maize (82.11%). The respondents had low satisfaction regarding the enlighten the importance of millets to increase the area in district (80.00%) training programmes on new technologies in paddy and groundnut (78.95%), training programme on application of bio fertilizers in paddy (78.95%).

The Table 2.clearly showed that the RBK in-charges of Madanapalli division faced the difficulty of not getting the inputs in time at their respective centres (77.89%). About 63.16 per cent of respondents had lack of technical

List of Mandal wise RBKs

S.No	Name of the mandal	No. of RBKs
1	Madanapalli	**18**
2	Kurabalakota	**11**
3	Thamballapalli	**12**
4	Nimmanapalli	**12**
5	Molakalacheruvu	**15**
6	B.Kottakota	**12**
7	PeddaTippasamudram	**15**
	Total	**95**

Table 1.Perception of Capacity building programmes attended by RBK in-charges of Madanapalli division

(N=95)

S. No.	Title of the programme	Satisfied		Unsatisfied	
		N	%	N	%
1	Integrated Pest and Disease management in Paddy	90	94.74	5	5.26
2	Training programme on New Technologies in Paddy and Groundnut	75	78.95	20	21.05
3	IPM Practices in Groundnut and Tomato.	80	84.21	15	15.79
4	Training programme on Seed Treatment in Groundnut and Maize	83	87.37	12	12.63
5	IPM practices in Redgram	80	84.21	15	15.79
6	Importance of Green Manures	78	82.11	17	17.89
7	Nutrient Management in Field crops and Horticultural crops	89	93.68	6	6.32
8	Training programme on Application of Bio fertilizers in Paddy	75	78.95	20	21.05
9	Best Management Practices to be followed in major crops	81	85.26	14	14.74
10	Enlighten the importance of Millets to increase the area in district	76	80.00	19	20.00
11	Integrated Nutrient Management in Groundnut	88	92.63	7	7.37
12	Management of Fall Armyworm in Maize	78	82.11	17	17.89
13	Training programme on Inter-crops and Trap crops	89	93.68	6	6.32
14.	Fertilizer management in Ratoon Sugarcane	83	87.37	12	12.63
15.	Awareness on New varieties, Marketing and value addition	80	84.21	15	15.79
16.	ICTs for Agricultural Development	81	85.26	14	14.74
17.	Human Resource Development and Management	80	84.21	15	15.79

knowledge regarding the agriculture and allied aspects. Unerringly 60.00 percentage of respondents informed that farmers had non receptive behaviour regarding RBKs. Untimely supply of subsidy seed was reported by 58.95 per cent respondents. 53. 68 percentage of respondents stated that godowns are needed to store the inputs like fertilizers at the centres. Nearly 47.36 per cent of respondents informed that there is a problem in budget availability to the centres. 29.47 per cent of respondents responded that there is poor internet connectivity

Table 2.Problems/difficulties faced by RBKs in implementation of the programmes(N=95)

S. No.	Problems/Difficulties	N(%)	Rank
1.	Lack of Technical Knowledge	60 (63.16)	II
2.	Poor internet connectivity and apps are not working properly	28 (29.47)	VII
3.	Need godowns to store the inputs like fertilizers	51 (53.68)	V
4.	Not getting the inputs in time	74 (77.89)	I
5.	Untimely supply of subsidy seed	56 (58.95)	IV
6.	Need maintenance charges for RBK sanitation	24(25.26)	VIII
7.	Non receptive farmers	57 (60.00)	III
8.	Non- availability of Budget	45 (47.36)	VI
9.	No Vehicle facility	18 (18.95)	IX

and some apps are not working properly at the centres. Respondents also conveyed that they need maintenance charges for RBK sanitation (25.26%) and vehicle facility is not available (18.95%).

CONCLUSION

The present study paves a path in strengthening the RBKs at village level by providing need based training programmes to the RBK in-chargers and also rectifying the difficulties faced by the in-chargers in implementing the programmes. Further support from the extension system of ANGRAU and Government of A.P. will fortify the new extension reform.

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IMPACT ASSESSMENT ON KNOWLEDGE AND ADOPTION OF SOIL HEALTH CARDS FOR SOIL HEALTH MANAGEMENT IN CHITTOOR DISTRICT OF ANDHRA PRADESH

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ABSTRACT

Healthy soil is a fundamental requirement to ensure the sustainable agriculture production. The Soil Health Card (SHC) is analysis of the quality of the soil right from its functional characteristics to water and nutrient status and its biological properties, whereas the basic objective of the soil testing is to provide recommendations to the farmers for the optimum and economic use of fertilizers and better soil management practices to increase agricultural production in their farm. In this connection RASS – Krishi Vigyan Kendra, Tirupati conducted a study in Nindra, Yerravaripalem and Chinnagottigallu mandals of Chittoor district during 2021 to analyze the knowledge level of farmers towards Soil Health Cards and adoption of results of soil health cards given by the KVK. Among the above three mandals, from each mandal two villages were selected purposively which are adopted by the KVK and from each village 20 farmers were selected by using simple random sampling, who formed 120 respondents for the study. The study revealed that the increasing pattern regarding the number of awareness programmers and training programs towards soil health management and number of soil samples analyzed by KVK (650 nos to 1520 nos) during last five years i.e. 2016 – 2020. Results indicated that the majority of the respondents belonging to middle age group of 35 - 55 years (51.67%) followed by old age (29.17%), high school education group (40.83%) followed by upper primary (26.67%), medium land holding group having 2 - 5ha. (43.33%) followed by small land holding (31.67%). It was observed that majority of the respondents were fallen in medium level of knowledge (65.8%) followed by high knowledge (21.6%) and medium adoption of soil health card results (60.8%) followed by higher adoption (22.5%) category. The reason behind the partial adoption and no adoption of Soil Health Cards might be due to their unawareness about the benefits of balanced fertilizer application and soil health management strategies in the farming.

Key words: Soil Health management, Soil Health Card, Soil fertility, Knowledge, Adoption

INTRODUCTION

Soil health and fertility is the basis for sustainable agricultural production and profitability of the farmers. Using balanced doses of fertilizers and cropping pattern as per the scientific recommendation is the first step towards

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sustainable farming. Soil testing is a scientific tool for assessment of soil fertility status and soil ailments and for nutrient amendment recommendations. Soil testing, as a tool for judicious fertilizer use, works on the principle of profitability, meaning if all other factors of production are at optimum and none of them limiting, there is all probability to obtain more profitable response to applied nutrients based on soil testing than those applied on need basis. Therefore the preseent study was conducted by RASS – Krishi Vigyan Kendra with the following objectives:

1. To assess the knowledge level of farmers on Soil Health Cards and Soil Health Management.
2. To analyze the adoption of soil health card recommendations by the beneficiary farmers.
3. To elicit the constraints in adoption of Soil Health Card recommendations.

MATERIALS AND METHODS

The present study was conducted in Chittoor District of Andhra Pradesh. The district consists of 66 mandals. Among the 66 mandals Nindra, Yerravaripalem and Chinnagottigallu mandals were purposively selected and two villages from each mandal were selected purposively which are adopted by the KVK. From each village, 20 farmers were selected by simple random sampling thus making a total of 120 respondents for the study. Rashtriya Seva Samithi (RASS) – Krishi Vigyan Kendra (KVK) has been conducting awareness programmes, method demonstrations and training programmes on soil testing since its inception in adopted villages. To assess the knowledge level towards soil testing and soil health cards and the extent of adoption of recommendations of soil health card, a pre tested interview schedule was prepared and data is collected by personnel interview. Age, education and land holding were taken as independent variables and level of knowledge and Extent of adoption were taken as dependent variables for the study.

RESULTS AND DISCUSSION

The study deals with the impact of the various extension programmes on soil health management conducted by KVK, independent and dependent variables and their impact on Knowledge level and extent of adoption regarding recommendations of Soil health Cards. About 116 number of different programmes were conducted by the KVK from 2016 to 2020 (Table 1). The results indicated that the number of soil sample analysis increased with the year from 650 numbers during 2015-16 to 1520 numbers during 2019-20. The reason behind this might be due to the conduct of series of awareness programmes for the benefit of farming community, which facilitated notable extent of adoption of soil testing. The findings of present study are in accordance with the findings reported by Diraj et al. (2014) reported that training is vital and essential to induce motivation, create confidence and increase the efficiency of farmer

INDEPENDENT VARIABLES

The data (Table.2) indicated that majority of the respondents (51.67%) from middle age i.e. 36 - 55 age group followed by 29.17 per cent and 19.17 per cent from high age group and young age group, respectively. This might be due to moving of young age people for other

Table 1: Details on various extension programmes on soil health management and soil analysis at KVK, Chittoor from 2016-2020

S. No.	Year	No of programmes	Number of soil samples analyzed	Number of villages covered
1	2015 -2016	18	650	75
2	2016 -2017	23	886	92
3	2017 -2018	11	732	97
4	2018 -2019	28	988	102
5	2019 -2020	36	1520	108
Total		**116**	**4776**	**474**

Table 2: SHC beneficiaries based on their age (N = 120)

S. No.	Age group	Frequency	Percentage
1	Young age (below 35 years)	23	19.17
2	Middle age (36 -55 years)	62	51.67
3	Old age (above 55 years)	35	29.17
Total		**120**	**100.00**

Table 3: SHC beneficiaries based on their education (N = 120) (Scale by Supe, 2007)

S. No.	Education	Frequency	Percentage
1	Illiterate	09	7.50
2	Primary school	17	14.17
3	Middle school	32	26.67
4	High school	49	40.83
5	Graduate	13	10.83
Total		**120**	**100.00**

Table 4: SHC beneficiaries according to their Land holding (N = 120)

S. No.	Land holding	Frequency	Percentage
1	Marginal (up to 1.0 ha)	12	10.00
2	Small farmers (1 - 2 ha)	38	31.67
3	Medium farmers (2 - 5 ha)	52	43.33
4	Large farmers (More than 5ha)	18	15.00
Total		**120**	**100.00**

Table 5: Respondents Knowledge on issues related to Soil Health Card and its usage

S. No.	Statement on knowledge on Soil testing and Soil Health Card	Knowledge (%)	Rank
1	What is soil humus?	23.33	XIX
2	Do you know about soil Health Card Scheme?	37.50	XVI
3	What are the micro nutrients mentioned in SHC	24.17	XVIII
4	What are secondary nutrients present in SHC	12.50	XX
5	What are major nutrients covered in SHC	94.17	I
6	From where soil samples should be collected?	61.67	X
7	In how many places soil should be collected per acre for soil testing?	48.33	XV
8	What is the depth that Soil sample has to be collected in cultivated land for food crops?	71.67	V
9	What is the depth that Soil sample has to be collected in land for Horticultural crops?	65.83	VIII
10	What is the validity period of SHC recommendations?	35.83	XVII
11	Is it SHC provides information about pH and EC?	82.50	II
12	Can we improve the fertility status and productivity of soil through SHC information?	70.00	VI
13	Can we alter the crop planning and scientific farming through SHC information?	75.83	III
14	The pH value for acidic soil ranges between 4 to 6	51.67	XIV
15	What is used as an amendment for acidic soil?	57.50	XIII
16	What is used as an amendment for alkaline soil?	59.17	XII
17	How soil fertility will be maintained?	74.17	IV
18	How crop yield can be enhanced?	60.83	XI
19	Do you know the application of fertilizers to the field based on the results of SHC?	63.33	IX
20	Details present in SHC- dosage of fertilizer application to crops	69.17	VII

Knowledge Index (KI) = Total knowledge score obtained / Total attainable Score X100

Knowledge Index = 1139.17 / 2000 X 100 = 56.95

occupations in cities due to higher income compared to Agriculture. In case of education, majority (40.08%) of the respondents were educated up to high school level, where as 26.6 per cent up to middle level, 17.0 per cent up to primary school, 10.8 per cent were graduates and 7.5 percent were illiterate (Table.3). Similar findings were reported by Chowdary *et al* (2018). Most of the respondents were practicing agriculture in medium land holdings i.e. 2 – 5ha (43.3%), followed by small farmers (31.6%), large farmers (15.0%) and marginal farmers (10.0%) respectively.

INDEPENDENT VARIABLES

Knowledge level

It was revealed from Table 5 that among the 20 statements about soil testing and soil

Table 6: Distribution of respondents according to their overall Knowledge level on Soil Health Card (N = 120)

S. No.	Knowledge level	Frequency	Percentage
1	Low (up to 33.33%)	15	12.50
2	Medium (33.3 to 64.66%)	79	65.83
3	High (above 64.66%)	26	21.67
Total		**120**	**100.00**

Table 7: Distribution of respondents according to their overall Adoption level on Soil Health Card (N = 120)

S. No.	Adoption level	Frequency	Percentage
1	Low (up to 33.33%)	21	17.50
2	Medium (33.3 to 64.66%)	73	60.83
3	High (above 64.66%)	26	21.67
Total		**120**	**100.00**

health Card 94.17 per cent of the SHC beneficiaries have knowledge on the statement 'What are the major nutrients covered in SHC' and was accorded the first rank. 82.50 per cent of the SHC beneficiaries had knowledge on the statement 'is it SHC provides information about pH and EC? was ranked second. The statement 'Can we alter the crop planning and scientific farming through SHC information ranked third by the SHC beneficiaries with 75.83 cent knowledge. The statements 'How soil fertility will be maintained?' and 'What is the depth that soil sample has to be collected in cultivated land for food crops? ranked fourth and fifth with 74.17 per cent and 71.67 per cent knowledge respectively. Reason for more knowledge obtained by SHC beneficiaries might be due to their regular and periodical contact with the Agriculture department and also with the Krishi Vigyan Kendra officials. The lower percent of knowledge level of SHC beneficiaries may be attributed to the lack of awareness about the features of SHC related to secondary and micro nutrients.

It is reported that SHC beneficiaries had more than 50 percent knowledge on soil testing and soil health card usage as Knowledge index is 56.95.

It was observed from the Table 6 that, more than half of the respondents belonging to medium knowledge level (60.83) followed by high knowledge level (21.67) and low knowledge level (17.50). The probable reason for the majority of farmers having medium level of knowledge could be due to the fact that lack of awareness about soil health. The finding was in line with study conducted by Madhu et al. (2020).

From the above table it is concluded that majority of the respondents belonging to medium adoption level (60.83), followed by higher adoption level (21.67) and lower adoption level (17.50) with regard to adoption of soil health

management practices by using soil health cards results. The reason for medium adoption might be that the majority of the respondents are having medium knowledge about soil health management and belonging to medium education level. The findings were in line with the findings of Manimekalai et al. (2021).

Constraints of the farmers towards adoption of soil health card recommendations

The data illustrated in Table 8 revealed that majority of the respondents (85.83) expressed that they are facing difficulty having knowledge about importance of the micro nutrients, 81.67 percent of the respondents expresses their constraint as fertilizer prices are too high to purchase. About 65 percent of the respondents were expressed that the calculating fertilizer dose on the basis of nutrient status of soil is very difficult. Later non availability of organic manure and lack of proper knowledge about scientific method of soil sampling were stand in 4th and 5th rank with 61.67 and 52.50 percentages. These findings are in coincidence with the findings of Naruka et al. (2018).

CONCLUSION

There is need a need to motivate the farmers to follow soil test based fertilizer application. Therefore it is suggested to conduct more number of practical demonstrations; training programmes and awareness programme to be organized on large scale. Awareness meetings on interpretation soil health cards and taking samples before farmer presence are needed.

Table 8: Constraints faced by the farmers in adoption of soil health card (N=120)

S. No.	Constraints	Frequency	Percentage (%)	Rank
1	Difficulty in calculating fertilizer dose on the basis of nutrient status of soil	78	65.00	III
2	Lack of knowledge about scientific method of soil sampling	63	52.50	V
3	Not able to understand the results given in soil health cards	39	32.50	X
4	Lack of knowledge about the importance of micronutrients	103	85.83	I
5	Use of more fertilizers leads to more yields	61	50.83	VI
6	No awareness about importance of soil testing	43	35.83	IX
7	Non –availability of organic manures	74	61.67	IV
8	Prices of fertilizers are high	98	81.67	II
9	Sometimes adequate quantity of fertilizers not available	57	47.50	VII
10	Issue of soil health card was too late	31	25.83	XI
11	Soil testing not done in their fields	19	15.83	XII
12	Non availability of micro nutrients in the market	56	46.67	VIII

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META ANALYSIS ON THE CONSTRAINTS FACED BY WOMEN ENTREPRENEURS

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ABSTRACT

Ideologically women were on par with men; but, in reality they were imprisoned within their house by socio-cultural customs and taboos. Women empowerment is possible only through entrepreneurship. Women entrepreneurship not only empowers women, but also paves way for better balancing of society, social upliftment of the country and economic development of the Nation. In order to promote women entrepreneurship, there should be a favorable environment which supports its growth for which the constraints faced by women entrepreneurs should be eliminated. Hence, this study is exploratory in nature which depicts the status of women entrepreneurship in India and Tamil Nadu and also reveals the constraints encountered by the women entrepreneurs. Though government has taken several initiatives to promote women entrepreneurship, still most of them were unaware of the government schemes and financial assistance. Conducting entrepreneurial related training, awareness campaigns, providing financial and technical assistance and updating them with latest technology, aids in improving their entrepreneurial traits and stimulate women entrepreneurship in India.

Keywords: Women entrepreneur, Women entrepreneurship, Constraints, Obstacles, Importance, Status.

INTRODUCTION

Women in India accounts for half of its population (Census, 2011). The status of Indian women in the society had a drastic change over the past few decades. Over a period of time, women were found to have relation with 3K's(i.e.) Kitchen, Kids, Knitting and their contribution to society was unrecognized. Globalization and economic liberalization at the time of independence, made them to 3P's (i.e.) Pickles, Pappad and Powder. In this modern era, perception of society towards women is changing. Nowadays, most of them were educated and had female literacy rate of 65.46 per cent. Women at present excelled in 3E's (i.e.) Electricity, Engineering and Energy. Wherever women stepped their foot became a remarkable success from kitchen to space, from home maker to

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president, and many other different forms. Simultaneously, proportion of women in workforce is gradually increasing. By nature, every woman possesses the traits of an entrepreneur by managing their households. Socio-cultural customs and taboos imprisoned women within the four walls and hid their potential. Nowadays, women involved in harnessing their hidden potential for productive purpose.

Women entrepreneur and women entrepreneurship

The word 'entrepreneur' has its origin from French root word 'enterprendre', which means 'to undertake'. Cantillon (1755) introduced the term entrepreneur for the first time. Drucker (1970) defined entrepreneur as 'An entrepreneur searches for change, responds to it and exploits opportunities. Innovation was a specific tool of an entrepreneur hence an effective entrepreneur converts a source into a resource'. An innovative individual who own the risk bearing capacity, alter every condition into chance and place themselves towards the future can be rightly called as an entrepreneur. The economic profit from their enterprise was a reward for their innovativeness and risk assuming character.

Consequently, Government of India (1984) defined women entrepreneurs as,'an enterprise owned and controlled by a women having a minimum financial interest of 51 per cent of capital or giving at least 51 per cent of the employment generated'(Goyal & Prakash, 2011); (Sharma, 2013). Kadharlal and Premevathy (2008) defined women entrepreneurship as, 'It was a process where women getting herself employed and provides job to others also'. Thus, women entrepreneurship empowers women by making them self-sustaining and pave way for better balancing of the society.

METHODOLOGY

This study is exploratory in nature and attempts to interpret the scenario of women entrepreneurship in India. The main objective of the study is to review the existing studies on constraints confronted by women entrepreneurs. However, the studies pertaining to women entrepreneurship in India, Tamil Nadu and constraints faced by the women entrepreneurs of India were taken into consideration. Status of women entrepreneurship was interpreted using Annual Report (2014-15)of MSME by Ministry of Micro, Small and Medium Enterprises (MSME), Sixth Economic Census (2016) by Government of India, Census (2011)General Census Report of India and Female Entrepreneurship Index (2015) by Global Entrepreneurship Development Institute are used as quantitative source of information.

Need and importance of women entrepreneurship

Global Entrepreneurship Development Institute in 2015 conducted a survey among 77 countries and released Female Entrepreneurship Index, in which India secured 70th rank. It depicts that there was no adequate and friendly environment for growth and development of women entrepreneurship in India. It was bitter fact that, half of the Indian population was women and they were not fully participating in the economic activities. Swami Vivekananda opined that, 'The best thermometer to the progress of a Nation is its treatment of its women'. Hence, in order to raise the status of women in society, it is not only an opportunity but also becomes a necessity to make them

participate in economic activities. Vijayakumar and Jayachitra (2013) in their study figured out that, to exploit the unidentified business opportunities in India, there was a dire need of women entrepreneurs. To promote women entrepreneurship in India, the constraints experienced by them should be eliminated. Annette Dixon, Vice President of World Bank South Asia in her speech 'The Economic Times Womes's Forum (2018)' held in Mumbai, India pointed out that 'If around 50 per cent of the women in India could join the workforce, India could boost its growth by 1.5 per cent to 9 per cent per year'. She also commented that,'if a woman is economically empowered and then they would invest their earnings for their children and community which lead to poverty reduction'. By understanding the constraints of the women entrepreneurs, helps the Government to eliminate the obstacles in the development of women entrepreneurs and their enterprise.

Current status of women entrepreneurship

In today's scenario, women are no inferior and equal to men in all walks of life. Similarly, women entrepreneurs are successful and had a remarkable effect in their field of work. Ministry of Statistics and Program Implementation through the Sixth Economic Census (2016), revealed the status of women entrepreneurs in India. In India, only 8.05 million (13.76%) were found to be women entrepreneurs among 58.5 million entrepreneurs. 13.45 million people of India were employed in theestablishments of women entrepreneurs. Among the 8.05 million women entrepreneurs in India, 34.3 per cent (2.76 million) of them were engaged in agricultural sector while remaining 65.7 per cent (5.29 million) of them were engaged in non-agricultural sector. In the agricultural sector, contribution oflivestock (31.6%) was a crucial part among all other farming activities.

Among 361.76 lakh enterprises in India, 26.61 lakh enterprises were owned by female in the MSME sector; which in turn provide employment to 120 lakh female employees out of 805 lakh employees (Annual Report, 2014-15). Nearly 10 per cent of the enterprises in MSME sector of India were owned by women (Mahajan, 2013). Supporting this, Vinoth and Revathy (2016) from their study, identified that among the total number of Indian entrepreneurs only 10 per cent of the entrepreneurs were found to be women. Accordingly, India was regarded as one of the world's fastest growing startup ecosystem whereas only nine per cent of themwere women (Sushma, 2018). Eventually, it depicted that India had a little space for women entrepreneurs.

Subsequently, in India, Tamil Nadu (13.51%) holds a greater number of women established enterprises, followed by Kerala (11.3%), Andhra Pradesh (10.5%), West Bengal (10.3%) and Maharashtra (8.25%). Based onMsme Report on 12th Fyp (2012-17), it could be understood that Tamil Nadu possessed the highest number of units registered by women. In addition to this, in Tamil Nadu, 80.81 lakh people were employed through 12.94 lakh registered units. Lakshmi (2004), Founder Trustee of BharatiyaYuva Shakthi (BYST), stated that "Women in Tamil Nadu were the best entrepreneurs in the country; they had shown that they could make excellent entrepreneurs if they get support by way of finance and guidance".

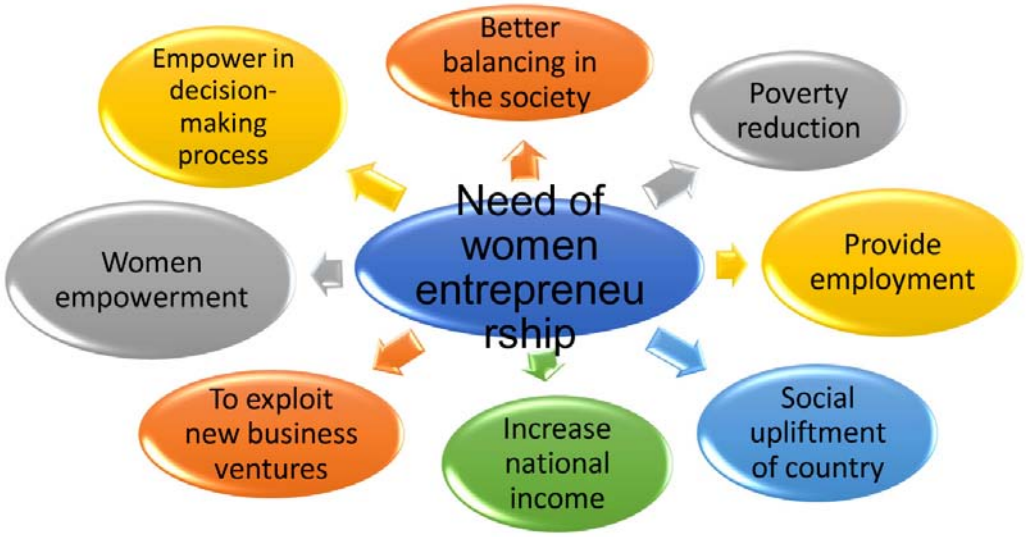

Fig.1. Need of women entrepreneurship

Constraints confronted by women entrepreneurs

Women entrepreneurs of India encounters profusion of challenges at starting stage as well as operating stage of enterprises. Easwaran (1992) observed that one out of every five business women face active resistance from family members in business.Lack of family support and access to peer support discourage women to become an entrepreneur (Choudhary, 1995). Availing bank loan for starting capital and working capital; Competition in business and marketing were regarded as top challenges by women entrepreneurs (Punitha *et al.*, 1999). Dhameja (2002) examined the wide range of constraints encountered by the women entrepreneurs, which includes social, personal, marketing, mobility, government support, production, financial and labor related problems, poor technical expertise and stress of work life balance. Live-stock farm women were confronted with a range of financial, marketing, labor, general/ personal, managerial and technical constraints as major challenges (Narmatha *et al.*, 2002).

Lack of family and community support, lack of managerial experience, non-availability of land, plots and premises, lack of knowledge about marketing of the product, inadequate government assistance regarding loan and subsidy were some of the challenges(Rao, 2002).Family discouragement, social barriers, lack of self-confidence and risk bearing capacity, psychological factors, lack of practical knowledge, problem of finance, problem of marketing, problem of middlemen and lack of market information hinder the growth of women entrepreneurship (Naik, 2003); Kamalakannan (2005). Gopal (2005) observed that most of the times a women's family obligations were her obstacles in conducting her entrepreneurial activities.

Non-availability of long-term finance, regular and frequent need of working capital, poor location of shop, lack of transport facility, non-availability of raw material, health related

problems, problem of lack of proper and space facility were identified as main challenges confronted by women (Nayyar *et al.*, 2007). Stiff competition from established and large units, family obligations in rural as well as urban areas; lack of electricity and securing working capital in rural area; financial insufficiency and high labor cost in urban area were identified as most prominent challenges to women entrepreneurs of rural and urban areas(Savitha, 2007). Financial constraints, scarcity of raw materials, over dependency on intermediates, stiff competition, low mobility, family responsibility, high cost of production, low level of risk-taking ability, social status, lack of education, absence of ambition for achievement and low need for achievement create obstacles for women entrepreneurship (Madhu & Suman, 2008).

Financial crises, raw material selection, collection and storage, and marketing problems were some of the constraints experienced by women entrepreneurs (Sujata & Vandana, 2008). Sowmya (2009) observed that rural women encountered financial, marketing, production and labor related problems. Shortage of finance, marketing problem, shortage of raw material, stiff competition, high cost of production, limited managerial ability, lack of entrepreneurial training pose a serious challenge to women entrepreneurship in India (Goyal & Prakash, 2011). Low repaying capacity of loan by women entrepreneurs because of lack of education poor skills, lack of mobility, poor infrastructural support, gender discrimination; pose a serious challenge Thangaraju (2011). Problem of dual duties and lack of resources create obstacles for women entrepreneur Aparna and Patel (2012).

Behara and Niranjan (2012)observed that choice between family and career, low level of education, scarcity of financial assistance, socio-cultural hurdles hinders the women entrepreneurship. Lack of strong leadership, financial deficiency, lack of systematic planning and working, health problem, non-awareness of Government scheme, non- repayment of loan by the members, leaders misusing the group's money, lack of education and lack of proper training were identified as prominent challenges experienced by women entrepreneurs (Palaniappan *et al.*, 2012); (Pharm & Sritharan, 2013). Women entrepreneurs often report challenges associated with family, financial, health,location and marketing problems (Saurabh, 2012).Male dominated society, our old traditions and limitations were identified as prominent challenges to women entrepreneur (Senthilkumar *et al.*, 2012).

Siddiqui (2012)enlisted the major problems of women entrepreneurs in India which includes gender discrimination, women's family obligations, problem of finance, low risk-taking ability and male - female competition. Inadequate and timely entrepreneurial training and education, lack of prior managerial and industrial experience and lack of technical and general skill hinder the growth of migrant women entrepreneurs (Azmat, 2013).Challenges like high labor cost, securing working capital, tight repayment schedule, non-provision of entire loan amount , low level of subsidy amount , long distance of the market, lack of transportation facility, delay in payments, low price for the produce, high labor cost, unavailability of skilled workers, high cost of feeds/ inputs, health problems, non-co-operation of family members,

dual duties, and lack of leisure time restrains the growth of women entrepreneurs(Giridhara, 2013).

Women entrepreneurs encounter problems like poor financial freedom, no direct possession of property, lack of self-confidence, lack of specific agenda of life, absence of knowledge about capacities, imbalance between family life and career, and low accessibility to bear risk (Kumbhar, 2013). Low credit worthiness and absence of accurate collateral pose serious challenge to women entrepreneurs (Mahajan, 2013).Lack of literacy and lengthy procedures for bank loan voluntarily exclude women entrepreneur from banking service (Nehru & Bhardwaj, 2013). Lack of prior managerial and industrial experience, lack of technical and general skill, inadequate and timely entrepreneurial training and education were the prominent challenges faced by Indian women entrepreneurs (Prasad *et al.*, 2013).

A wide range of problems such as lack of exposure, limited managerial skills, lack of self-confidence, lack of education facilities, patriarchal society, social obstacles, legal norms, increasing cost of production limits the growth of women entrepreneurs (Sharma, 2013). Dual duties, poor access to finance and restrictions in spatial mobility were some of the common challenges experienced by women entrepreneur (Tamilarasi, 2013). Socio-cultural barrier, lack of self-confidence, lack of exposure to training, awareness about the financial assistance were the obstacles that exist in the way of women entrepreneurs (Kumar, 2014).Women often experience additional challenges and bottlenecks because of their gender (Jain S & Jain, 2014). Lack of self-confidence limits the growth of women entrepreneursNandy and Kumar (2014). Unmarried women entrepreneurs had to bear double responsibilities at home and work, when getting married(Parveen, 2014).

Arrangement of finance, cut-throat competition, shortage of raw materials and family conflicts were some of the common challenges experienced by women entrepreneurs (Priyanka Sharma, 2014).Lack of skills and professionalism affects income from the enterprise and also low amount of investment by women entrepreneurs limits the size of their enterprise (Tuschano, 2014).Lack of adequate education, skills, training and unfavorable social system hinder the growth of women entrepreneurship (Ansari, 2016). Lack of good education inhibits women entrepreneurs to adopt an innovation (Gautam & Mishra, 2016).Factors like weak marketing network, lesser marketing experience, poor sales strategies, strong competition, delay in payment by clients and rapid change in demand and technology pressurize women entrepreneurs (Hasan *et al.*, 2016). Social barriers, gender discrimination, lack of education, dual and triple responsibilities of a women entrepreneur reduce her productivity (Garg & Agarwal, 2017).

Mertiya (2017)listed some of the common challenges encountered by women entrepreneurs which were dominance of male family members, lack of education, inadequate financial resources and working capital, lack of knowledge, insufficient arrangement for marketing and sale, heavy competition, lack of experience, lack of transport facilities, high cost of production, lack of land and other facilities, no risk bearing capacity, lack of guidance, too much workload in family, excess of social responsibilities, lack of co-operation, poor

storage facilities, low profit, shortage of raw materials and least interest of family. Problem of delay in securing finance from banks and other institutions was regarded as a crucial problem by the women entrepreneurs of Tamil Nadu(Stalin, 2017). Socio-cultural customs and taboos trap women in their house and acts as a discouraging factor for growth of women entrepreneurship(Ganguly, 2020).Madhumitha and Karthikeyan (2020) identified that high labor cost and stiff competition from large sized units pose a major threat to women entrepreneurs.

Role of government in promoting women entrepreneurship in India

A number of government and non-government institutions play a major role in promoting women entrepreneurship in India. Government of India formulated several initiatives to provide training and financial assistance to the women to start their own ventures; which in turn provide employment opportunities to a large number of people and aids in promoting Indian economy.

During 8th Five Year Plan, Government introduced Prime Minister's Rojgar Yojana (PMRY) and Entrepreneurship Development Programme (EDP) to develop entrepreneurial qualities among rural women.

- 'Women in agriculture' scheme to train farm women in agriculture and allied activities.
- 'Women co-operatives' schemes to help women in agro-based industries.
- 30 – 40 per cent reservation for women under Integrated Rural Development Programme (IRDP) and Training of Rural Youth for Self- Employment (TRYSEM) schemes.
- Khadi and Village Industries Commission (KVIC) were established in remote areas to provide employment opportunities to women.
- During 9th FYP, to promote women entrepreneurship through small-scale industries, Government of India introduced,
- Trade Related Entrepreneurship Assistance and Development (TREAD) to develop entrepreneurial qualities of women entrepreneurs in rural, semi-urban and urban areas.
- 'Women Component Plant' – a strategy adopted to provide assistance to women entrepreneurs.
- Swarna Jayanti Gram Swarozgar Yojana (SJGSY) and Swarna Jayanti Sekharo Rozgar Yojana (SJSRY) to provide reservations for women and to encourage them to start their own ventures.
- 'Women Development Corporations' to assist women entrepreneurs in availing credit and market facilities.
- State Industrial and Development Bank of India (SIDBI) introduced MahilaUdyam Nidhi scheme, Micro-credit scheme for women, Mahila Vikas Nidhi, Women entrepreneurial development programmes, marketing development fund for women.

Some of the MSME funded schemes to promote women entrepreneurship in India were

1. Annapurna scheme
2. Stree shakti package for women entrepreneurs
3. Bharatiyamahila bank business loan

4. Dena shakti scheme
5. Udyogini scheme
6. Cent kalyani scheme
7. Mahilaudyamnidhi scheme
8. Mudra yojana scheme for women
9. TREAD (Trade Related Entrepreneurship Assistance and Development) Scheme

Hence, there was a need to make women aware of the schemes about women entrepreneurship that motivate them at grass root level.

SUGGESTIVE MEASURES

To promote women entrepreneurship in India, it becomes imperative for government to frame comprehensive policies for the welfare and development of women entrepreneurship. The development programmes should aim to improve the economic and social status of women as its long-term objective through various social, economic, political and cultural activities. In order to promote women enterprises, International Labor Organization (ILO) and African Development Bank jointly devised a comprehensive framework which focuses on ten core areas. They were,

- Policy leadership and coordination focusing on women as separate segment of clients.
- Legal and regulatory policies supportive of women entrepreneurs.
- Promotion policies of governments for women entrepreneurs
- Access to Credit and Financial Services
- Access to enterprise education and training
- Access to business development and business information
- Access to women enterprise networks and associations
- Access to business premises
- Access to markets
- Research on women entrepreneurs

Focusing these areas create conducive environment for the growth of women entrepreneurs (Assessing the Enabling Environment for Women in Growth Enterprises : An Afdb/Ilo Integrated Framework Assessment Guide, 2007).

Providing managerial and technical assistance, space and infrastructure facility, financial assistance, increased awareness about government schemes and institutional support, providing good education, vocational training programmes, removing socio-cultural barriers, family encouragement, co-operation from all spheres,motivateswomen entrepreneurs and improve their entrepreneurial skills, which in turns develops the Indian economy.

CONCLUSION

Women entrepreneurs often face challenges because of their gender while starting an enterprise as well as in operating stage of an enterprise. Lack of education, lack of skills, family obligations, health problems, gender discrimination, lack of entrepreneurial training, dual duties, low access to resources, lack of skilled labor, lack of transportation, high cost of inputs, changing market scenario, low spatial mobility, low credit worthiness, high labor cost, stiff competition between enterprises and male-female competition, lack of market information,

lack of social contact, unaware of financial assistance and government schemes, etc were the challenges often reported by women entrepreneurs. By providing timely training, financial assistance, subsidy, encouragement, co-operation by family members and society, women can do wonders. The social system and attitude of the society towards women was the root cause for most of the problems experienced by women entrepreneur. Though technological advancement reduced some of the problems, most of the problems can be eliminated only if there was a mental revolution to change the perception of society about women. Women entrepreneurs were regarded as the catalyst for economic development. Thus, it becomes necessary to empower women, not only for economic development but also for better balancing of the society and poverty reduction.

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TECHNOLOGY INTERVENTIONS AND EXTENSION ACTIVITIES FOR LIVESTOCK DEVELOPMENT IN CHIKKABALLAPUR DISTRICT, KARNATAKA

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ABSTRACT

Technology diffusion through interventions and adoption of timely extension approaches are very critical for livestock development to increase family income, to create self-employment and to generate rural economy in particular and to support the overall rural development process. It is a never ending and continuous process to target the need based technological support to the farming community. This paper *shares various experiences of technology interventions and various extension activities implemented in Chikkaballapur district, Karnataka for improving productivity under Bhoosamrudhi project, a joint collaboration between Karnataka Veterinary, Animal and Fisheries Sciences University (Bidar) and* International Crops Research Institute for the Semi-Arid Tropics (*ICRISAT*), Patancheru, Hyderabad. *Through this project f*armers were educated on cost effective, sustaininable innovative technologies. Farmers were reached out through several training programs on various technologies in animal husbandry, demonstrations on dry fodder enrichment, silage making and balanced feed preparation, artificial Insemination in Sheep and Goats and preparation of extension materials for the farmers and also capacity building programs for field Veterinarians.

INTRODUCTION

Karnataka is one of the top states in India which contributes substantially to the total milk, meat and egg production. Scope to improve its production through adopting improved technologies and good practices is huge. Farmers have to be educated on cost effective, sustaining and innovative technologies. State universities, line departments, NGO's and private sector organisations have got a pivotal responsibility of reaching farmers with these technologies and practices. In this context, an attempt has been made by Veterinary College, Hebbal under the umbrella of Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar in implementation of Bhoosamruddhi project entitled "Research and Extension Activities for Livestock Development in Chikkaballapur District, Karnataka" funded by ICRISAT and implemented in the year 2019-20.

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The objectives of the project were to provide; Training programs for farmers on various technologies in animal husbandry, Capacity building programs for Field Veterinarians, Demonstration of Dry fodder enrichment, Silage making and Balanced feed preparation, Artificial Insemination in Sheep and Goats and Preparation of extension materials for the farmers.

MATERIAL AND METHODS

Purposive sampling technique was adopted in selection of Chikaballapur district for implementation of the project as it is one of districts under Bhoosamrudhi Yojana of Karnataka state, and two talukas, Gowribidanur and Shidlagatta were also purposively selected. Among these two taluks, 4 villages were selected based on the livestock population and as per the meetings and discussions held with the officers of State Animal Husbandry department.

A baseline survey was conducted with about 700 farmers from 4 villages identified by the researchers and various meetings/ awareness programmes regarding the objectives of the project were also carried out. Pre exposure and Adoption studies were carried out in the project villages, before Awareness programmes, trainings and demonstrations were conducted focusing on the objectives of the Bhoosamruddhi project.

RESULTS AND DISCUSSION

This project had extended its services and inputs to 4 villages and has directly benefited approximately 620 farm families. The package of scientific practices and technologies diffused through this project encompasses the following:

Technology Interventions

Farmers were given demonstrations and were educated on the technologies like Dry fodder enrichment, Concentrate supplement preparation, Silage making in silo bags, Fodder nurseries and Veterinarians were trained on Artificial insemination in sheep and goats.

Dry Fooder Enrichmenrt

Crop residues form the major source of roughage available to farmers for feeding livestock (>70%). An animal should consume optimum level of dry matter and fibre to perform and yield normally. In the project area, the major dry fodder source was ragi and jowar straw. It was observed that, more than 50 per cent of the farmers fed only dry fodder during summer. Dry fodder such as crop residues, during the summer is the main fodder source for many farmers which need to be stored and utilized properly. All the respondents in the project area had stored the dry fodder in the form of Hay stock at their farms. Dry fodder wastage is mainly because of not chaffing before it is fed to the animals. Hardly 30 per cent of the farmers practised chaffing of dry fodder to feed their animals.

In order to educate on the importance of dry fodder and to maximize its utilization, chaffing of dry fodder and its advantages were demonstrated in 8 areas. Urea treatment and ammoniation techniques using maize stover, sorghum stovers, paddy straw and ragi straw were taught to the farmers. Storage structures, plastic drums, silo bags and plastic sheets could be used to store the enriched dry fodder. The details of the procedure to be followed were demonstrated using 25 kg chaffed maize stover.

Demonstrating dry fodder enrichment by simple urea treatment

Sprinkling urea solution evenly on the chaffed dry fodder

Urea used was 500 gram (2%) dissolved in 10 liter water. The enriched fodder was fed to the animals. Also some part of it was stored in the plastic sheet making it air tight. After 21 days of time period, the ammoniated fodder was fed to the animals. Enrichment of crop residues by urea treatment/urea ammonification can increase intake of dry fodder, balance the nutrient supply, increase the digestibility and sustain the performance of livestock at minimum cost.

Concentrate supplement preparation

Importance of balanced ration feeding to the livestock is highly essential. In the project area mostly the animals were fed with monocot grasses. Green maize was major annual fodder crop along with Napier grass and *Sesbania* was the major dicot fodder. Feeding green fodder only during the lush green season was noticed. During the summer, animals were maintained mostly by feeding dry fodder along with tree fodder viz., *Sesbania, Neem, Melia dubia, Subabul, Moringa* etc. Farmers having irrigation facilities only had grown green fodder during summer. None of the farmers were aware of balanced feed preparation and its utilities.

Keeping the above things in mind, demonstration programs for educating the importance of balanced feed were planned. Farmers were educated on balanced feed preparation using locally available crop by products/feed ingredients such as cereal grains, brans, pulses, oil seed cakes, salt, mineral mixture etc. Eight demonstrations were carried out in different villages. A total quantity of 50 Kg balanced feed comprising of different feed ingredients was demonstrated. Ground maize was majorly used i.e., 24.5 kg, along with 13.0 kg of rice bran, 10 kg soya bean meal, 2 kg mineral mixture and 0.5 kg of salt.

Silage making by using silo bags

During the summer or off season, green fodder availability is very much scanty. In such situations, silage serves as an alternate fodder source for the livestock. To maintain the health and production of animals, it is thereby recommended to feed the livestock both green and dry fodder daily. But due to lack of irrigation facilities and other factors, many farmers in the arid region depend on dry fodder during the summer. This inturn leads to poor performance

Demonstrating concentrate feed preparation at Saragondlu

Demonstration at Narayanadasarahalli

by the animals. In recent times, silo bags of different capacities are locally available which can be utilized even by the small and marginal farmers with low investment.

All the respondents in the project area were using green fodder either by cultivation in their own field or by grazing and by purchasing from others. Maize, Sorghum and Napier grass were the fodder varieties grown at the project area along with fodder trees like Sesbania, Neem, Moringa, Melia dubia, etc. At times of excess production of Maize and sorghum their fodder were harvested, dried and stored as heaps/hay stocks. This showed the lack of awareness on preservation methods like silage preparation, hay-lage preparation, etc. Hence silo bags of capacity 750 kg were distributed to the identified beneficiaries under the project. Eight such demonstrations were carried out at the project area. Green fodder such as Maize, Jowar, Napier were used by different farmers to prepare silage using silo bags.

Artificial Insemination in Sheep and Goat

Sheep and goat rearing has been part of farming families since centuries. Sheep and goats are regarded as “Walking ATM”. There is a large scope for increasing the production in terms of meat and other by products. In the project area, according to baseline survey, the sheep and goat population was 1,861 out of which 1,604 were sheep and 257 goats.

Elite ram and bucks introduction was one of the measures to improve the genetic potential of sheep and goats. Artificial insemination (AI) in sheep and goat is taking wings in the rural areas. Farmers can opt for elite rams/bucks semen. This technology would help the farmers to overcome inbreeding depression among the flocks.

AI in sheep and goats was proposed in 4 villages of the project area. Before inseminating, the animals were screened for pregnancy. Non pregnant ones were selected and subjected to additional concentrate feeding along with deworming. After 21 days the animals were inseminated with the elite ram/buck semen. Conception rate of 50% has been obtained. The Skill of carrying out artificial insemination in small ruminants was imparted to Veterinarians in the area of implementation of AI.

Demonstration at Saragondlu and Gangagalli

Observations and Constraints:

1. Results of AI varied between flocks of the same village
2. Fertility was largely related to nutritional status of the females
3. Farmers failed to follow instructions imparted regarding feeding
4. Animals inseminated were sold before pregnancy diagnosis was carried out
5. Body condition score of the animals in the selected villages was low (BCS 1.5-2)

Capacity building on field Technologies

The objectives of Bhoosamrudhi Project and action plan were discussed with the officers.Veterinary officers working at different places of Gowribidanur taluk and Shidlaghatta taluk were given training on field technologies such as Mobile application on dairy and fodder production, animal nutrition and feeding aspects and use of non-conventional feeds in livestock production, artificial insemination in Sheep and Goats and other technologies intended to reduce the cost of production. Artificial insemination was demonstrated and the officers had hands on experience at field level.

Pregnancy test by scanning the animal & selecting it for AI

Addressing the gathering

Mobile apps on Animal Husbandry

Establishment of Fodder Nursery

Non availability of fodder seeds, root slips water scarcity, unaware of improved fodder varieties, labour scarcity, dependency on agricultural and commercial crops, avoiding cultivation of fodder varieties were some of the challenges experienced by the farmers in the study area.

Fodder Nursery Establishment

Sowing at Saragondlu, Gowribidanur Taluk

In order to address these issues, four fodder nurseries were established in 4 different villages of the project area. Fodder varieties including monocot, dicot along with fodder trees were introduced in these nurseries. These nurseries in future would become a good source of fodder seeds/root slips/stem cuttings to other interested dairy farmers in and around the villages. Education on the importance of feeding leguminous and non leguminous fodder mixture was imparted to the farmers.

Field Day

In order to create awareness and educate the farmers about the improved varieties of fodder, field day was conducted in the farmers field involving farmers from the same village and neighbouring villages as well. Importance of Green fodder *viz.,* Monocots, Dicots and tree species was explained to the farmers. To expose farmers to different varieties of fodder and to educate them on the cultivation aspects, harvesting stage, processing, preservation, feeding quantity, etc. field visits were carried out along with the subject matter specialists.

Hon'ble Vice Chancellor,Prof. H.D. Narayanaswamy-Chief Guest

ಪ್ರಜಾವಾಣಿ 7

ಪ್ರೊ.ಎಚ್.ಡಿ.ನಾರಾಯಣಸ್ವಾಮಿ ಸಲಹೆ

ಹಾಲಿನ ಗುಣಮಟ್ಟ ಕಾಪಾಡಿ

Coverage of the program in 'Praja Vani'- a local news paper

Farmers were insisted to cultivate the same varieties in their farms by procuring the seeds/ root slips/stem cuttings from the fodder nursery.

The event was documented and telecasted by Dooradarshan, Chandana TV Channel under "Krishi Darshana" program on 24.10.2019, 04.11.2019 and 02.12.2019.

Animal Health and fertility camps

Animal health and fertility camps were organized at three villages of the project area, two at Gowribidanur taluk and one at Shidlaghatta taluk. The camps provided a platform to the farmers to get their animals treated which had various health issues/ problems. The teaching faculty along with PG and Ph.D. students and the internees provided their services to the animals in the camp. From all the three camps conducted, we treated more than 350 large animals and small ruminants were treated. Around 600 sheep and goats along with large animals were dewormed.

Extension Publications

Dairy Kannada and Fodder Kannada mobile applications are helpful to farmers. To publicize and in turn to educate the farmers about modern technologies of animal husbandry, 100 Stickers (A4 size) were prepared and distributed to the Milk Producers Cooperative Societies at Gowribidanuru and Shidlaghatta taluk. These stickers would help the farmers to access information at times required. This project brought out 8 folders on Green fodder cultivation, Silage making in Silo bags, Dry fodder enrichment, Balanced feed preparation, Clean milk Production, Ram/Buck introduction, Pig Rearing and Sheep feeding. A flip chart and a booklet on "Improved Practices of Animal Husbandry" were also published and distributed.

Policy Implications

Gaps in technology adoption at field level need to be addressed through policy interventions by line departments like State

Animal health camps

ಪ್ರಜಾವಾಣಿ 4

ರಾಸುಗಳ ಆರೋಗ್ಯ: ಕಾಳಜಿ ವಹಿಸಿ

ಹೈನುಗಾರಿಕೆಗೆ ಹಲವು ಯೋಜನೆ

Coverage of the program in 'Praja Vani'- a local news paper

Animal Husbandry and Veterinary Services and Milk Federations.

·More emphasis should be applied to area specific demonstrations of technologies and establishment of successful models (livestock farms, fodder plots, integrated farming etc...) among the farming community at village level.

Timely inputs and services to be provided for adoption of best scientific practices

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STRENGTHS AND WEAKNESSESOF CUSTOM HIRING CENTERS IN FARM MECHANIZATION IN SRIKAKULAM DISTRICT

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ABSTRACT

Establishment of Custom Hiring Centre (CHC) in farm mechanisation is a boon for farmers especially for the small and marginal farmers but yet to reach in large scale. This holds good for Srikakulam district . Keeping this in view an extension study has been taken up with an objective of "SWOT Analysis of Custom Hiring Centres in Farm mechanization in Srikakulam District" . 30 Custom hiring centres located in five sub divisions of the district were selected purposefully for the study. The respondents selected for the study were CHC owned farmers , hired farmers and non hired farmers each 30 ,thus total sample size was 90.An exploratory research design used for the study. Results revealed that the strengths perceived by the farmers were1. Recognised the need of CHC and Aware about it(100%), Time saving in farm operations(100%), timely own farm operations (100%) and Uniform cropping pattern for a large area(96.67%) and weaknesses were Lack of finance and credit facilities(100%), Not affordable by the small and marginal farmers(94.44%), Lack of knowledge about use of machinery and the CHC Services(83.33%), More depreciation less durable and low quality(82.22%). Policy makers may consider the weaknesses to formulate solutions for these problems and consider the strengths for further improvement in promotion and establishment of CHCs.

INTRODUCTION

Agricultural mechanization implies the use of various power sources and improved farm tools and equipment, with a view to reduce the drudgery of the human beings and draught animals, enhance the cropping intensity, precision in metering and placement of inputs and timelines of efficiency of utilization of various crop inputs (seed, chemical, fertilizer, irrigation, water etc.) and reduce the losses at different stages of crop production. The end objective of farm mechanization is to enhance the overall productivity and production with the lowest cost of production.

Mechanization of farm activities is the need of hour to increase production and productivity. Though subsidy is being provided for farm machinery, due to prohibitive cost of farm machinery all farmers may not come forward to own them. Hence, establishment of Custom Hiring Service Centre(CHSC) is a boon for farmers especially for the small and marginal farmers.

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Table 1 . Selection of the respondents

S. No	Sub division	Mandal	Village	OF	HF	NHF	Total
1	Palakonda	Palakonda	Ampili	3	3	3	9
		Burja	Singannapeta	3	3	3	9
2	Rajam	Rajam	MJ Valasa	3	3	3	9
		Vangara	R.Gummada	3	3	3	9
3	Srikakulam	Gara	Gara	3	3	3	9
			Srikurmam	3	3	3	9
4	Tekkali	Kotabommali	Regulapadu	3	3	3	9
		Nandigam	D.G.Puram	3	3	3	9
5	Ranastalam	Ranastalam	Velpurai	3	3	3	9
		G.Sigadam	G.Kancharam	3	3	3	9
		Total		30	30	30	90

This holds good for Srikakulam district .Keeping this in view an extension study (approved in SLTP 2018) has been taken up with an objective of “SWOT Analysis of Custom Hiring Centres in Farm mechanization in Srikakulam District”

MATERIALS AND METHODS

30 Custom Hiring Centers located in five sub divisions of the district were selected purposefully for the study. The respondents selected for the study were CHC owned farmers , hired farmers and non hired farmers each 30,thus total sample size was 90.

Based on preliminary discussion with the experts, officials, owners, dealersthe following Criteria considered for SWOT Analysis of CHCs.

1.Establishment of CHCs,

2.Availability of the equipment,

3.Cost of the machinery,

4.Source of the machinery.

5.Procurement of the machinery,

6.Suitability of the machinery offered for CHCs,

7. Field suitability for CHC Machinery,

8.Depreciation of the machinery in CHC,

9.Decisionempowerment while establishing CHCs,

10. Repairsand maintenance of farm machinery,

11. Profitabilityof CHCs and

12. Promotion of CHCs

Results and Discussion

Table 1 Strengths of Custom Hiring Service Centers as perceived by the farmers

S.No	Particulars of Strengths as perceived farmers	Frequency	Percentage
1	Recognised the need of CHC and Aware about it	90	100.00
2	Time saving in farm operations	90	100.00
3	Help in timely farm operations	90	100.00
4	Uniform cropping pattern for a large area	87	96.67
5	Govt. support for establishment of CHC	85	94.44
6	DOA and AP Agros are the Source of machinery supply	85	94.44
7	Existence of farmer groups	80	88.89
8	Basic local workshops available for small repairs	73	81.11
9	More no. of farmers come forward for taking CHCs	72	80.00
10	Easy availability for establishment of CHC	55	61.11
11	Availability of new Agriculture technologies	55	61.11
12	Immediate sanction of the unit by the dept.-	28	31.11
13	More no. of land preparatory equipment	27	30.00
14	Affordable for certain machines	27	30.00
15	Own decision as higher Socioeconomic status	24	26.67

Interview schedule developed for the study and data collection is in progress. Data will be analyzed with the use of appropriate statistical tools

RESULTS AND DISCUSSION

Results revealed from the table1 that all (100%) the respondent farmers recognized the need of custom hiring services and its establishment, efficiency of farm machinery in terms of saving the time and timely operations it might be due to the scarcity and high wage rates of farm labour and their dwindled farm operational efficiency. Most of the farmers (96.67%) of the farmers perceived that uniform cropping pattern for large area is the prominent strength for establishment of custom hiring service centres. About ninety percent of the respondent farmers perceived the Govt. support ,source of supply of implements and existence of farmer groups were the major strengths for establishment and smooth running of CHCs. It might be due to the earlier initiatives of the

Table 2.Weaknesses in Custom Hiring Service Centers as perceived by the farmers

S.No	Particulars of Weakness as perceived by the farmers	Frequency	Percentage
1	Lack of finance and credit facilities	90	100.00
2	Not affordable by the small and marginal farmers	85	94.44
3	Lack of knowledge about use of machinery and the CHC Services	75	83.33
4	More depreciable less durable and low quality implements	74	82.22
5	Negligence about maintenance	70	77.78
6	Lack of knowledge on calibration of machinery	70	77.78
7	Inadequate extension services	55	61.11
8	Delay in subsidy delivery to the supplying agencies	54	60.00
9	Lack of agricultural engineering institutions for better learning	54	60.00
10	Lack of planning for getting the equipment	51	56.67
11	Poor infrastructure facilities	45	50.00
12	Negative attitude	45	50.00
13	Lack of enough publicity	45	50.00
14	Overlapping of certain machinery	27	30.00
15	Injudicious rental charges	26	28.89

Government in promotion of farmer groups like Rythu Mithra groups , commodity interest groups and farmer clubs.

It can be obserted from the Table 2 that Hundred percent of the respondent farmers perceived the lack of self finance and credit facilities as major weakness for establishment of CHCs, it might be due to most of the farmers were small and marginal farmers and could not afford to establish the CHCs**.** Nearly 83.33 per cent of the farmers perceived that lack of knowledge on availability and use of farm machinery and low quality implements were the major weakness factors for establishment of CHCs because of lack of manufacturing and training institutes on farm machinery. 77.78% of the farmers perceived that lack of knowledge on calibration of the machinery particularly seed drill and MSRI units. Poor maintenance of the machinery and infrastructure facilities were the predominant weakness factors for establishment of CHCs.

Suggestions given by the farmers under study

1. Government custom hiring centre should be required in mandal level, so that the price of Custom hiring of agricultural machinery is fixed and low as compared to offers by private CHCs.
2. Training relating to farm machinery and equipment should be given to the farmers and artisans.
3. The farm machinery should be tailored to feasable for different types of soil and operations.
4. Technical know-how should be provided to the farmers with respect to appropriateness of farm machinery for the situation and for its properuse.
5. Standardization and quality-marking centres of farm equipment should be Established in potential areas of the country.
6. Social audit also required for the sanction and maintenance of CHC units

CONCLUSION

Policy makers may consider the weaknesses and threats and formulate solutions for these problems and consider the strengths and opportunities for further improvement in promotion and establishment of CHCs. Government should establish custom hiring centres atleast at mandal level, so the price of custom hiring of agricultural machinery is fixed and low as compared to offers by private owner of machinery. Take the measures to provide trainings relating to farm machinery and equipment should be imparted to the skilled personnel,farmers and artisans.

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J. Res. ANGRAU

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IMPACT OF COVID 19 ON AGRICULTURE: ROLE OF ICT INTERVENTIONS DURING PANDEMIC ERA

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ABSTRACT

The spread of novel coronavirus Covid-19 at the beginning of March 2020 significantly squeezed agri sector, especially fruits and vegetables. The closure of schools, restaurants, offices, and others has shifted supplies ofagribusiness to retail channels. One of the prevailing issues faced by farmers in managing crops and finding aconducive place to market their products. In this view, the farmers' marketplace needs to evolve to continuouslysupply farmers' products to consumers. Agriculture itself is undergoing a fourth revolution activated by the use ofinformation and communication technology (ICT). This paper provides insights into how mobile app technologiescan promotein solving the agri and allied sector relatedglitches like soil degradation, excessive water, emissions, pollutions, themarketplace, etc. We find mobile app features have widely developed for farmers, distributors, and producers together valuable data, observe fields, and manage crops to optimize the processes. Mobile apps and cloudcomputing become a hub of solutions. In this global pandemic, providing support to farmers with useful andpractical agricultural information can improve their economic development and eventually give a good impact onthe country.

Key words: Pandemic, Food Security, and Indian Economy

INTRODUCTION

The COVID-19 outbreak has taken the ecosphere completely unmindful, exposing the vulnerability of agricultural system along with public health in surviving with these pandemics. Immediate preparation, response and recovery at local, national and international levels are the only solution in this status quo. Similarly, India also fallen short in all the sectors, which has accelerated COVID-19 to spread like wildfire across hundreds of countries, affecting lakhs and killing thousands. International Food Policy Research Institute (2020) projected that even under an effective COVID-19 containment scenario, 14 million to 22 million people may have to face extreme poverty across the globe and many low- and middle-income countries may have to witness about 25% decline in agri-food exports.Addressing the COVID impact requires all of us to work together across all sectors and local and international borders to mitigate the immediate impacts of the pandemic and to

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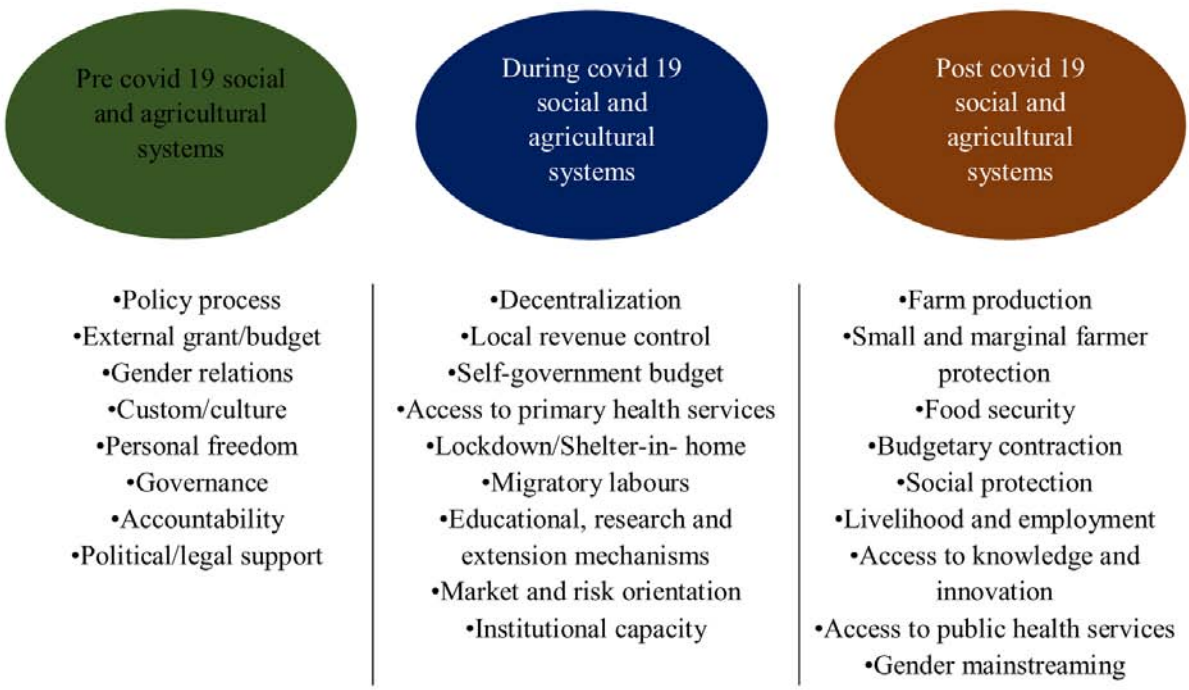
reshape food systems and support healthy diets for all people and increase foThe Covid-19 pandemic has impacted the supply chain worldwide and some international industrieshave been scale back to the domestic level. Farmers are a crucial part of the supply chain who have toadapt to a new and uncertain future. Fortunately, in these few years before the pandemic, farmers andthe agribusiness industry were actively embracing technologies. One popular article has reported therapid growth of agriculture technologies and predicted technologies like IoT devices, drones, andsoftware to be worth over $15 million by 2025. Since purchasing technologies and farm managementsoftware is a pricey decision, moving directly to a smaller scale of agricultural apps becomes astrategic alternative. Especially variety of apps are available in the market and they can be installed onmany platforms like Androids and IOS. Recently, plenty of mobile apps have appeared for individualfarmers and demand is still increasing particularly in the pandemic situation. This trend has given roomfor mobile apps developers to meet farmers' demandsof production and consumption aligned to sustainable development (UN, 2020).

Current impact of COVID-19 on agricultural system:

During the high period seeds and other farm inputs have to reach to the farmers according to the season, while India needs about 250 lakh quintals of seeds. Because, everything may wait, not the farming season and hunger. A complete seed production ecosystem is complex and requires the help of allied sectors such as transport, testing labs and the packaging industry. However, fear spreads faster than COVID-19. Central and State governments of India have already announced exemptions for the agriculture sector viz. seeds, labourers, and other farm activities. Special packages have also



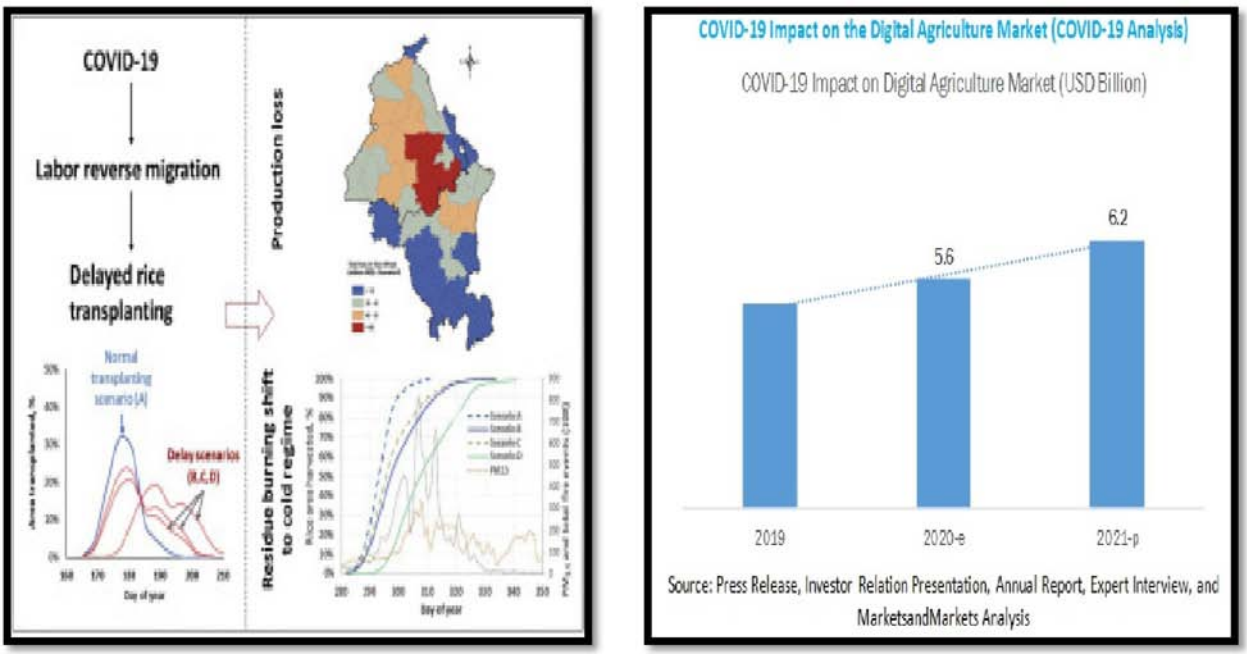


Fig: 1. Figure showing the impact of Covid 19 in delayed transplantation of rice and Digital Agriculture Market

been allotted for different sectors as well as railways have been fixed firmly to ease transport logistics. Despite of these, in certain areas roads are blocked and movement of labour is not allowed. Transport services are not allowed to operate after all (Singh, 2020).

METHODOLOGY

Data Collection: Secondary data was collected for the study.

Research Design: Descriptive research was done for the study.

RESULTS AND DISCUSSIONS

Agricultural extension to help the farmers during and in post COVID-19 crisis:

Mississippi University Extension revealed that, in the time of COVID-19, extension agents are no longer delivering in-person training, providing technical support on a host of matters at distance basis. To keep people informed on COVID-19, Extension faculty and administration members sharing messages through webinars, written communication, and/or technical assistance over phone (Buys, 2020). Where, University of Delaware has specialists in food safety, child development, family science, health literacy, etc. They are also making connections through video, social media, and print resources in this crisis period (Extension Disaster Education Network, University of Delaware, 2020).

Indian extension experts also have to come forward to join their hands in this life-threatening period. Extension system in India with the large networks from KVKs, state and central agricultural universities, to ATMA, ATARI and ATIC can help the farmers by giving advices for maintaining their daily sanitized lives along with farm operations. Indian Council for Agricultural Research (ICAR) have taken the mission to train

the farmers about the varying agricultural operations and to make them attentive of social distancing, covering faces, maintain washing of hands-on regular basis with the help of behaviour change communication. Thus, dissemination of right information and awareness using the right channels at this stretch of pandemic are the key goings-on being performed by the Indian agricultural extension professionals (Pandav *et al.*, 2020).

Immediate access to required agricultural technologies and digital agri-solutions

Digital agriculture can help to offer a wide range of support to address the impacts of COVID-19 on agricultural production, labour availability, input supply, and logistics. In China agricultural drone helped to address labour constraints and to reduce human contact amid COVID-19. Thus, drones and other digital extension tools can help farmers adopt labour- and input-saving practices and link farmers to buyers and logistics services that will reduce the impacts of control measures related to COVID-19 on aggregators and supply chains.

Government of India also launched a new app *"Kisan Rath"* on 18 th April, 2020. Indian Council for Agricultural Research has issued an agro-advisory system to maintain cleanness and social distancing (Singh, 2020). Thus, public-private partnerships and investments in prevailing agricultural technology planshasten these solutions faster to help more people manage this pandemic situation due to COVID19. Besides, toll-free help lines in local languages must be started to answer the queries regarding government initiatives and for oppositionrecompence purpose and other farming related evidence (Padhee, 2020).

Some government organisations are also helping farmers for digital agri-solutions through ICT platforms e.g. Haritha Kerala Mission is arranging online classes on vegetable farming topic using Facebook live (Maji *et al.,* 2020). Though, recently the government of India has

Fig: 2. Agro-advisory services through *KISAN RATH APP* launched by GoI

Fig: 3Pictures depicting the logo of Haritha Kerala Mission

exempted farming operations, farm workers, custom hiring centres of farm harvesters and implements as well as mandis and procurement agencies from the lockdown rules (PTI, 2020).

Providing timely information:

Farmers need credible information tips and advisories to continue their practice. The ICAR-IVRI has developed comprehensive advisories on various facets of safe and hygienic milk, meat, and egg production as well as handling and marketing to deal with lockdown situations. ICAR has accommodated to the current lockdown situation by sharing these advisories via various online channels, including social media, Facebook, WhatsApp, and YouTube. The pandemic has compelled us to explore these channels even more to remain connected with the farmers and other stakeholders. EAS is increasingly depending on these online resources.

CONCLUSIONS

National and International development agencies must be in the front line to mobilize efforts to mitigate the penalties of COVID-19 on food and agriculture sector and, most significantly, to guard the food security of world

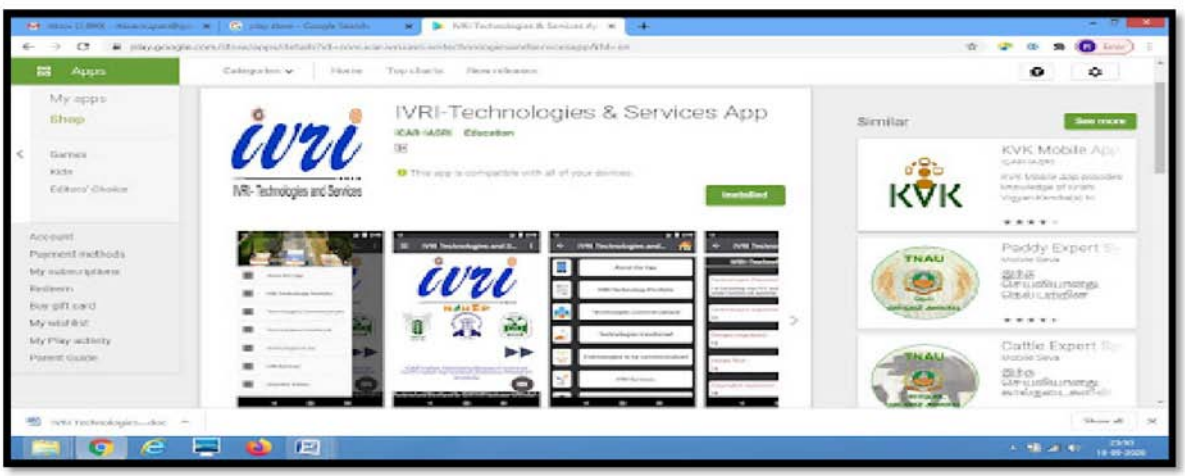


Fig: 4Advisory services of ICAR-IVRI through Mobile apps, Facebook and Watsapp

population. And in this mission along with the government decisions, agricultural research and extension wings have to come forward to help the farmers in the field, manufacturers of agro-chemicals and the logistics, otherwise, it will be grim to manage. Thus, effective communication and decision-making systems must be reinforcedinstantly, and extension personnels can help in this regard to save agriculture sector from the noticeable impact of COVID-19. Hence, more number of socio-economic research are needed incorporating Indian data for designing socio-economic models for India for coping with coronavirus crisis, without further delay.

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TRAINING NEEDS OF THE FARM WOMEN REGARDING THE VARIOUS AGRICULTURAL ACTIVITIES

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ABSTRACT

M. S. Swaminathan, the famous agricultural scientist describes that, it was afarm women who first cultivated various crop plants (pulses, vegetables, flowers, fruits, medicinal etc.) and there by initiated the skill and science of cultivation. The farm women start protecting the soil health by using animal waste and home waste and also through organic recycling. The farm women started to preserve good quality seeds and varieties for further use. Also use different techniques to minimize pest and disease attack. The women are the determination of agricultural women force and a vital part of National economy.' Training is approaching and developing individual's capabilities for better achievement in their working place. Training is very important for upgrading knowledge, getting technical skill and improving behavior at work. It involves the improvement in behavioral complex of human behavior for performing specific role and duties at their work place for achieving their specific goals and objective.' Mostly training is required for those women's which are illiterate. Training programs regarding their actual field constraints can enhance their ability and innovativeness. The farm women required training need about various agricultural activities was higher in namely processing, marketing, post-harvest operations, land preparations and lower in intercultural operations, seed bed preparation, bird watching and harvesting. The farm women i.e. (58.00 %) had medium level of training need in various agricultural activities followed by low i.e. (24.50%) and high i.e. (17.50%) level of training need in various agricultural activities.

INTRODUCTION

M.S. Swaminathan, the famous agricultural scientist describes that, it was a farm women who first cultivated various crop plants (pulses, vegetables, flowers, fruits, medicinal etc.) and there by initiated the skill and science of cultivation. The farm women start protecting the soil health by using animal waste and home waste and also through organic recycling. The women are the determination of agricultural women force and a vital part of National economy. Rural women performs different activities at same time i.e. manages household work, farm work, animal farming and also performing various small income generating work. Their dairy working activities typically include cultivation of different crops, dairy activities, goat rearing, poultry farming, storage and processing of food and

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preparing meal for family members, working for salary in agricultural or other allied occupations, engaging in exchange and selling, caring for family members and maintaining their house. ‘‘Training is approaching and developing individual’s capabilities for better achievement in their working place. Training is very important for upgrading knowledge, getting technical skill and improving behavior at work Mostly training is required for those women’s which are illiterate.

METHODOLOGY

Ahmednagar and Solapur district of Maharashtra state was purposively selected for the present study due to it has maximum area under agriculture and allied occupation. The ex-post-facto research design was used for the study. This design was considered appropriate because we are studying the phenomenon that has already occurred. It is a standardized empirical study in which the experimenter does not have any direct control of independent variables because their explanations have already happened. Two tehsil from each district namely Rahuri and Rahata from Ahmednagar district and Malshiras and Pandharpur from Solapur district was selected randomly for present investigation as having maximum area under agriculture and allied occupation. From each selected tehsil, the 05 villages were selected randomly. Total twenty (20 in number) villages were selected for research work. A sample of ten (10 in number) farm women from each village, making a total sample of two hundred (200 in number) farm women respondents was selected.

RESULTS AND DISCUSSION

Training need of farm women regarding the various agricultural activities:

The data on farm women which requires training in various agricultural activities are depicted in following aspects and given in Table 1.

A. Land preparation

In case of land preparation it was revealed that, the majority (90.00 %) of the respondents had training need in manure application while 89.00 per cent in leveling of field and 79.00 percent in manure mixing.

B. Seed bed preparation

In case of seedbed preparation it was revealed that, the majority (99.00 %)of the respondents had training need in seed treatment while 87.00 per cent in dibbling method of sowing, 85.50 per cent in planting method of sowing and 85.00 percent of the respondents in application of fertilizer to seed bed.

C. Intercultural operations

In case of intercultural operations it was revealed that, the 61.50 per cent of the respondents had training need in fertilizer application while(89.50 %) of the farm women had no training need in weeding.

D. Bird watching

In case of bird watching it was observed that, the majority i.e. 84.50 per cent of the respondents had no training need in bird watching.

E. Harvesting

In case of harvesting it was revealed that, the majority i.e. 84.00 per cent while remaining i.e.(85.50 %) of the respondents had no training need in cutting of crops and picking of pods/fruits/ flowers.

Table1.Distribution of the farm women based on their training need regarding the various agricultural activities

Sr. No.	Recommended technology	Yes	No	Average	Rank
A	**Land preparation**			**0.718**	
1	Leveling of field	178 (89.00)	18 (09.00)	0.91	
2	Collection of stubbles	37 (18.50)	163 (81.50)	0.185	
3	Manure application	180 (90.00)	20 (10.00)	0.9	**IV**
4	Manure mixing	158 (79.00)	42 (21.00)	0.79	
5	Pre sowing irrigation	39 (19.50)	161 (80.50)	0.805	
B	**Seed bed preparation**			**0.629**	
1	Nursery bed preparation	168 (84.00)	32 (16.00)	0.84	
2	Application of fertilizer and manure to seed bed	170 (85.00)	30 (15.00)	0.85	
3	Seed treatment	198 (99.00)	02 (01.00)	1	
5	Sowing				
	a. Direct sowing	27 (13.50)	173 (86.50)	0.135	
	b. Dibbling	175 (87.50)	25 (12.50)	0.875	**VI**
	c. Planting	171 (85.50)	29 (14.50)	0.855	
4	Irrigation				
	a. Surface irrigation	29 (14.50)	171 (85.50)	0.145	
	b. Drip irrigation	167 (83.50)	33 (16.50)	0.835	
	c. Water application by zari	26 (13.00)	174 (87.00)	0.13	
C	**Inter cultural operations**			**0.691**	
1	Gap filling	40 (20.00)	160 (80.00)	0.8	
2	Thinning	28 (14.00)	172 (86.00)	0.86	**V**
3	Fertilizer application	123 (61.50)	77 (38.50)	1	

Sr. No	Recommended technology	Yes	No	Average	Rank
4	Weeding	21 (10.50)	179 (89.50)	0.105	
D	**Bird watching**	31 (15.50)	169 (84.50)	**0.155**	**VII**
E	**Harvesting**			**0.152**	
1	Cutting of crop	32 (16.00)	168 (84.00)	0.16	**VIII**
2	Picking of pods/fruit/flower	29 (14.50)	171 (85.50)	0.145	
F	**Post-harvest operation**			**0.725**	
1	Threshing	168 (84.00)	32 (16.00)	0.84	
2	Winnowing	38 (19.00)	162 (81.00)	0.19	
3	Grading	177 (88.50)	23 (11.50)	0.885	**III**
4	Packing/Packaging	169 (84.50)	31 (15.50)	0.845	
5	Storage	173 (86.50)	27 (13.50)	0.865	
G	**Marketing**	176 (88.00)	24 (12.00)	**0.885**	**II**
H	**Processing**	183 (91.50)	17 (08.50)	**0.915**	**I**

F. Post-harvest operations

In case of post-harvest operations it was observed that, the majority (88.50 %) of the respondents had training need in grading while 86.50 percent in storage, 84.50 per cent in packaging and 84.00 per cent of the respondents had training need in threshing operations.

G. Marketing

In case of marketing it was observed that, the majority (88.00 %) of the respondents had training need in marketing.

H. PROCESSING

In case of processing it was observed that the majority i.e. 91.50 per cent of the respondents had training need in processing.

The Table30 indicates that, the training need of farm women about various agricultural activities. It may be arranged in descending order as processing(0.915), marketing (0.885), post-harvest operations (0.725), land preparations (0.718),intercultural operations (0.691), seed bed preparation (0.629), bird watching (0.155), and harvesting(0.152). It means that, farm women requires training need about various agricultural activities were higher namely processing, marketing, post harvest operations, land preparations and lower in intercultural operations, seed bed preparation, bird watching and harvesting.

Table 2.Distribution of the farm women according to the level of training need regarding the various agricultural activities.

Table 2.Distribution of the farm women according to the level of training need regarding the various agricultural activities.

Sr. No.	Training need index	Number of respondents(200)	Percentage
1	Low(Upto58)	49	24.50
2	Medium(59to70)	116	58.00
3	High(71andabove)	35	17.50
	Total	**200**	**100.00**

Mean=63.90 **S.D=6.40**

Table 2 shows that, the majority of farm women i.e. (58.00%) had medium level of training need in various agricultural activities followed by 24.50 percent of therespondents had low while 17.50 per cent of the respondents had high level of training need in various agricultural activities.

The above findings are in line with those of Ekka and Singh (2005), Sharma (2015) and Chouhan Geetanjali. 2016.

IMPLICATIONS

1. In view of enhancing women's work efficiency, Government and Extension worker should plan and execute need based training programmers.

2. Make insurance for Social promise and the legal safe guards of farm women working classes, particularly women heads of home labor, given women in mentioned region who have active participation in agricultural and allied occupation activities and spend a more time, but they do not have any financial support from government agencies.

3. Efforts should be made to assemble the male of our society sufficient open minded to accept the ability of the farm and rural women in the area of planning and managing in case of farm related activities.

4.The majority of the farm women had medium level of training need in agricultural activities. Farm women need training in following agricultural activities such as seed treatment, manure application, leveling of field, planting, grading, marketing and processing. It is therefore suggested that emphasis may be given by KVKs and NGOs to provide training.

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AN ASSESSMENT OF USAGE BEHAVIOURAL PATTERN OF UZHAVAN APP USERS (FARMERS) IN TAMIL NADU

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ABSTRACT

Before two decades information technology and agriculture were considered incompatible but today in this era of globalization. Mobile applications have become familiar among the people but in the field of agriculture, m-apps were in the stage of budding. As a step to deliver quality, timely and accurate agricultural information, Tamil Nadu Government has launched bi-lingual (Tamil and English) Uzhavan mobile application. *Ex-post facto* research design was adopted for the study and primary data was collected from a sample of 90 uzhavan app users in Thanjavur district of Tamil Nadu, India during January 2020 by personal interview with the help of well-structured and pre-tested [1]interview schedule prepared for the study. The result showed that uzhavan app users had browsed utmost seven sections and spent 6-10 minutes per day to browse the contents in the uzhavan app. Subsidy section, benefit registration and crop insurance had been the most often sought subjects by the uzhavan app users. Uzhavan app has relatively lowered the information searching time and it has created more awareness about agricultural government schemes.

KEYWORDS: Uzhavan app, m-agri app, farmers, ICT, e-agriculture and utility behavior.

INTRODUCTION

ICTs have become the essential factor for agricultural and educational development in the current century (Brown, 2002; Kozma andAnderson, 2002; Goodison, 2003; Kangro and Kangro, 2004; Hennessy *et al*., 2005; Kennedy *et al*., 2006; Bayindir and Inan, 2009) which is a powerful tool in addressing agricultural needs(Tshabalala, 2001).Twenty-first century would be deliberated as the age of information and communication technology (ICT). According to (Zahedi, 2012) ICT was an extensive term that comprise computer hardware and software, digital broadcast and telecommunication technologies as well as digital information repositories online or offline and also includes social networking aspects on the web besides online file sharing system (Allahyari, 2010). A smartphone is an e-toy designed for the lonely inner child hidden in each and every one of us.

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Smart-phones were extensively considered as a prospective tool for communication and disseminating information. Ganesan (2013) stated that now-a-days mobile applications have become familiar among the people but in the field of agriculture m-apps were in the stage of budding. Aravindh Kumar S and Karthikeyan(2019 and 2020) stated that education and income levels are strong determinants, not only of whether or not people use the Internet, but also of how they use it. Internet users with higher levels of education use more advanced services, such as e-commerce and online financial and government services, to a higher degree than Internet users with lower levels of education and income levels, who use the Internet predominantly for communication and entertainment purposes. Social media is a platform of enlargement, and for agricultural producers the major reason for producing such a platform is mass influence (Varner, 2012). It gives farmers direct opportunity to connect with customers(Carr, 2015) and the key values of communication provided by social media as peer-to-peer networking (Stanley, 2013). The fast penetration of ITC thus brings new opportunities for farmers to improve their knowledge and livelihoods (Asongu, 2015)&(Aker, 2010). Farmers conflicting perceptions (Fuess, 2011), lack of capacity (Newburry, 2014) in using social media act as the constraint to use social media in extension programme deliver, Farmers' neither technology savvy nor receiving quality information (FAO, 2019), thus leading to reluctance in the process of adoption of digital tools' (Diem, 2011). As a step to deliver quality, timely and accurate agricultural information, Tamil Nadu Government has launched bi-lingual (Tamil and English) Uzhavan mobile application in a bid to use technology for benefit of farmers. It was launched by Chief Minister of Tamil Nadu in the state capital Chennai on April 8, 2018. The size of the Uzhavan app was just 3.93 mb and it was made freely available to the people in Google play store and Apple store. Nearly 55, 55,587 people had downloaded the Uzhavan application. (ARISNET, 2020)[2]Uzhavan app a great initiative taken by Tamil Nadu government to deliver agricultural information, create awareness about agricultural schemes, disseminate market prices, weather forecast and also to establish contact between farmers and extension officials quicker than before. The objective of the study is to establish the usage pattern of uzhavan app. by the uzhavan app users (farmers).

MATERIAL AND METHODOS

An ex-post facto research design was adopted for the study. Sampling was done during December 2019, there were 38 districts in Tamil Nadu and Villupuram district counted more number of Uzhavan app users (AGRISNET, 2020). [3]Villupuram district was bifurcated into Villupuram and Kallakurichi districts during November 2019. However the Uzhavan app users was not available for the bifurcated Villupuram district. Hence, Thanjavur district which ranked second in terms of the number of Uzhavan app users in the state was purposively selected. Thanjavur district had 14 blocks among them, two blocks namely, Patukottai and Peravurani were selected for the study as it had relatively more number of Uzhavan app users. The list of Uzhavan app users in the two selected blocks was obtained from the Assistant Director of Agriculture, Thanjavur. From the list, a total of 90 Uzhavan app users comprising 60 from Patukottai block and 30 from Peravurani block

were selected by using proportionate random sampling method. Data was collected from the selected Uzhavan app users by personal interview with the help of well-structured and pre-tested interview schedule. After gathering the required information, data were statistically analyzed using the SPSS version 16.0.

RESULT AND DISCUSSION

Usage pattern of uzhavan app by the uzhavan app users (farmers)

Usage pattern in the sense of mobile applications could be described as particular way in which user utilize the mobile application. Informational, functional and temporal dimensions were the measurements used to identify the usage pattern.

It was understood from the table 01 that overwhelming majority (86.67%) of the users gained information about availability of uzhavan application through government extension officials. Subsequently 08.89 per cent of the users with the help of social media became aware of the presence of uzhavan application and 05.54 per cent of the users through friends/ neighbors came to know about the existence of uzhavan application. From the Table 01, it is reported that majority (60.00%) of the users were not aware of any other mobile agricultural applications than uzhavan app, 40 per cent of users were conscious about availability of other m-agri apps available in various platforms like Google play store, Apple store etc. From table 01, more than half (53.33%) of the users had

Informational dimension:

Table 01: Distribution of uzhavan app users according to their temporal dimension:(n= 90)

S.No.	Informational dimension	Category	Number	Per cent
1.	Source of information of availability of uzhavan app	Government Extension officials	78	86.67
		Private Extension staffs	00	00.00
		NGOs	00	00.00
		KVK	00	00.00
		Neighbors/Friends	05	05.54
		Fellow farmers	00	00.00
		Social Media	08	08.89
2.	Awareness towards other agricultural applications	Aware	36	40.00
		Not aware	54	60.00
3.	Source of agricultural information before using uzhavan app.	Government Extension Officials	48	53.33
		Private Extension staff	04	04.45
		NGO	00	00.00
		KVK	00	00.00
		Neighbors/Friends	17	18.89
		Fellow farmers	11	12.22
		Social Media	10	11.11

Functional dimension:

Table 02: Distribution of uzhavan app users according to their temporal dimension:(n= 90)

S.No.	Temporal Dimension	Category	Number	Per cent
1.	Preference of language	Tamil	78	86.67
		English	12	13.33
2.	Registration on uzhavan app. for receiving benefits	Registered and benefited	63	70.00
		Registered and not benefited	10	11.11
		Not registered	17	18.87
3.	Frequency of usage of subjects in uzhavan app.	Using 12 subjects	00	00.00
		Using 11 subjects	18	20.00
		Using 10 subjects	03	03.33
		Using 09 subjects	04	04.44
		Using 08 subjects	15	16.67
		Using 07 subjects	20	22.22
		Using 06 subjects	13	14.44
		Using 05 subjects	03	03.33
		Using 04 subjects	10	11.11
		Using 03 subjects	01	01.11
		Using 02 subjects	03	03.33
		Using 01 subject	00	00.00
4.	Most often sought subjects present in uzhavan app	Subsidy scheme	51	56.67
		Benefit registration	10	11.11
		Fertilizer stock	06	06.67
		Market price	05	05.56
		Crop insurance	04	04.44
		Agriculture news	04	04.45
		Weather forecast	03	03.33
		Seed stock position	03	03.33
		Customer hiring center	02	02.22
		Asst. Agri/ Asst. Horti visit	01	01.11
		Reservoir levels	01	01.11
		Feedback	00	00.00

depended on government extension officials as their source to get information about agriculture before the existence of uzhavan app. followed by 18.89 per cent of the users hinge on their neighbors/friends to know about latest agricultural information. About 12.22 and 11.11 per cent of the users had contingent on fellow farmers and social media as their source of agricultural information respectively. Few (04.44%) of the users has used private extension officials as their source of agricultural information before the existence of uzhavan application.

It is evident from the table 02 that, majority (86.67%) of the users were fond of Tamil language and they utilized Tamil for exploiting uzhavan app. Few (13.33%) users reported that they were comfortable with the contents present in the English. It is noticed from the table 02 that majority (70.00%) of the users used the benefit registration section, thereby registered and benefited. The finding shows that these two sections (subsidy scheme and benefit registration)were vitally responsible for the repeated utilization of uzhavan app by the users. About 18.87 percent of the users stated although they were aware of the agricultural schemes and subsidiesthey did not have the interest to register for receiving benefits. About 11.11 percent of the users had registered but not benefited, this might be due to two valid reasons, inappropriate selection of agricultural schemes or they failed to file the required document which was essential for the scheme. It is understood from the table 00 that 22.22 percent of the users had utilized seven subjects/sections present in the uzhavan app. About 20.00 percent of the users had utmost exploited11 subjects present in the app. About 16.67 percent users had utilized 8 of the subjects present in the app according to their need. About 14.44% and 11.11 percent of the users make use of six and four sections extant in the uzhavan app, respectively. Very few users (04.44%, 03.33%, 03.33%, 03.33% and 01.11%) utilized nine, ten, five, two and three subject's existed in uzhavan app, respectively. It was noticed that no users have reported that they have completely logged into all the subjects. No users had stopped their utilization with one subject. It is evident from the table 60 that more than half of (56.67%) of the users often pursued subsidy scheme section and 11.11 percent of the users regularly strived for benefit registration section. Rest of the users contributed for below one-tenth proportion like (06.67, 05.56, 04.45, 04.45, 03.33, 03.33, 02.22, 01.11 and 01.11 per cent) for frequently pursuing the fertilizer stock, market price, crop insurance, agricultural news, weather forecast, seed stock position, customer hiring center, asst.agri/asst.horti visit and reservoir level sections respectively. It was found that no user had sought to browse feedback section. The finding showed that nearly three-fourth (74.44%) of the farmers had utilized the subsidy section, benefit registration and fertilizer stock section to the maximum level because they felt that these sections were more essential and useful to them compared to other sections.

The data for the study was collected during January 2020, and from the table 01, it is evident that majority (83.33%) of the users downloaded the uzhavan application immediately, as soon as they came to know about uzhavan app and its salient features. Most of the users were attracted and got interest instantly towards the uzhavan application. Few users (16.67%) mobilized the uzhavan app after sometimes/due to peer pressure, though they were aware of the existence of uzhavan app they spared some period of time to curb whether uzhavan app is really useful or not. Table 01, indicated that nearly half (51.11) of the uzhavan app users were using the uzhavan application for a period of 7- 12 months, 44.45 percent of the uzhavan app users had experience over 13-18 months in using uzhavan application and very few (04.44%) of the users were subjected to less than 6 months period of handling the uzhavan application. From the table 01, 37.78 percent of the users had the habit of using uzhavan

Temporal Dimension:

Table 03: Distribution of uzhavan app users according to their temporal dimension:(n= 90)

S.No.	Temporal Dimension	Category	Number	Per cent
1.	Time of download of uzhavan application	Immediately after knowing about uzhavan app	75	83.33
		After sometime / Due to peer pressure	15	16.67
2.	Duration of usage of uzhavan app.	7-12 months	46	51.11
		13-18 months	40	44.45
		< 6 months	04	04.44
3.	Frequency of usage of uzhavan app.	Often daily	10	11.11
		Daily (once)	30	33.33
		Once in two days	34	37.78
		Weekly	15	16.67
		Fortnightly	01	01.11
4.	Session of usage of uzhavan app.	Morning	37	41.11
		Afternoon	10	11.11
		Evening	30	33.33
		Night	13	14.44
5.	Duration of usage of uzhavan app. per day	<5 minutes	03	03.33
		6-10 minutes	32	35.56
		11-15 minutes	26	28.89
		16-20 minutes	15	16.67
		21-25 minutes	08	08.89
		26-30 minutes	06	06.67

application for two days once, one-third (33.33%) of the uzhavan app users used the uzhavan application daily. About 16.67 percent of the uzhavan app users were found to have the custom of logging into the uzhavan application weekly. About 11.11 percent of users urged to use the uzhavan application often daily. Nearly one per cent (01.11 %) of the users had routinely using the uzhavan application every fortnight. It was exposed from the table 01 that 41.11 per cent of the users used the uzhavan application during morning, one-third (33.33%) of the uzhavan app users spent their evening for exploiting the uzhavan application subsequently during night. About 14.45 percent of the users had the habit of using Uzhavan application, 11.11 percent of the uzhavan app users made use of their afternoon hours for utilizing the uzhavan application. It is apparent from the table 01 that more than one-third (35.56%) of the users, used

the uzhavan application for 6-10 minutes per day. About 28.89 per cent of the users used to spend 11-15 minutes per day in uzhavan application. The users devoted 16-20 minutes per day for using uzhavan application has contributed to 16.67 per cent. About 08.89 and 06.67 per cent of the users expend the uzhavan application for 21-25 minutes per day and 26-30 minutes per day respectively. Very few users (03.33%) contributed less than five minutes per day towards uzhavan application.

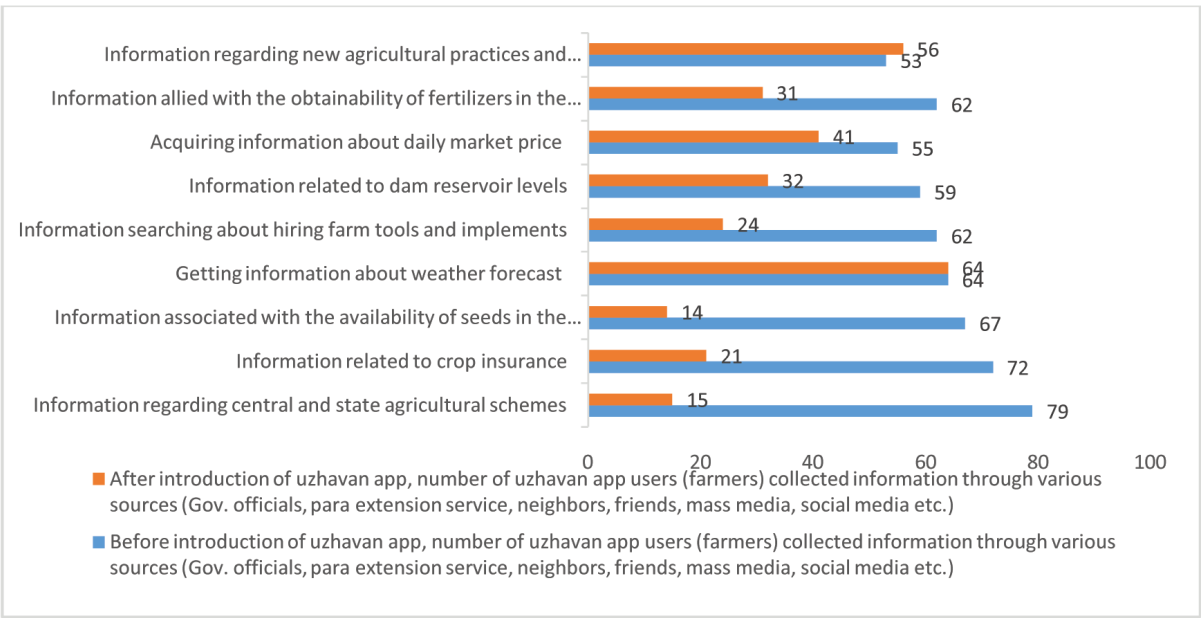
Before and after the introduction of uzhavan application

Null Hypothesis (H0): There was no significant difference between users (famers)collected agriculture related information through various sources (Government officials, para extension workers, neighbors, friends, fellow farmers, mass media, social media etc.) before introduction of uzhavan application and users (famers)collected agriculture related information through various sources (Government officials, para extension workers, neighbors, friends, fellow farmers, mass media, social media etc.) after introduction of uzhavan app.

t-test -3.890* St.deviation – 23.56 St. error- 7.85

Alternate Hypothesis (H1): There was significant difference between users (famers)collected agriculture related information through various sources (Government officials, para extension workers, neighbors, friends, fellow farmers, mass media, social media etc.) before introduction of uzhavan application and users (famers) collected agriculture related information through various sources (Government officials, para extension workers, neighbors, friends, fellow farmers, mass media, social media etc.) after introduction of uzhavan app.

From the result of depended sample t- test, null hypothesis was rejected and alternate hypothesis was accepted i.e., there was a significant difference between users (famers) collected agriculture related information through various sources (Government officials, para extension workers, neighbors, friends, fellow



farmers, mass media, social media etc.) before introduction of uzhavan application and users (famers) collected agriculture related information through various sources (Government officials, para extension workers, neighbors, friends, fellow farmers, mass media, social media etc.) after introduction of uzhavan app. Before the introduction of uzhavan app, famers has to be depend on various sources like Government extension officials, para extension workers, neighbors, friends, fellow farmers, mass media, social media etc., in the search for agriculture and its allied information. This caused more information seeking time. But, uzhavan app was considered to be a consolidated mobile agricultural application where famers can search agricultural information related to central and state agricultural schemes, crop insurance, availability of seeds and fertilizers in their region, hiring farm tools and implements, daily market prices, weather forecast and reservoirs details within a single click. The reduction in number of farmers who collected agriculture related information through various sources after the introduction of uzhavan app indicated that most of the uzhavan app users (farmers) have been convinced by the agricultural information provided through the uzhavan application expect in weather forecast and new agricultural practices and technologies provided in agricultural news section. Hence, the dependency of the farmers with others for seeking information has been greatly reduced with the help of uzhavan application. This result of the paired t-test also coincide with the farmer's perception. Uzhavan application not only reduced the information searching time but also deliberately made awareness about presence of various agricultural schemes (central and state) for marginal, small, medium and big famers. Uzhavan application has eased the process of registering and availing agricultural subsidy and benefits for the farmers in Tamil Nadu.

CONCLUSION

Farmers need accurate, brief, timely and trustworthy information to practice and perform agricultural activities. Regional language was more comfort and convenient for the users because with the help of their regional language, users could exploit every content present in the application to the maximum level. Though majority of the users in the study have completed colligate education they prefer regional language (Tamil) to English, this indicates that presence of contents in regional language would deliberately an advantage to reach more people. Some of the users had good experience with other m-agri apps like nithravivasayam, m-kisan app, paddy expert system app, cattle expert system app, coconut expert system app etc. Some users who shared that social media especially You tube and Face book was their main of source of awareness, which made them conscious about the existence of other m-agri apps. The finding of the study showed in a big picture, majority (66.67%) of the users have exploited utmost seven subjects present in the uzhavan app and one-third (33.33%) of the farmers utilized the uzhavan app. in the morning, before going to the field the farmers just log in to the uzhavan app and checks the weather forecast, reservoir details, agricultural news, and daily market price, starts the day with more updated knowledge. These sections present in the uzhavan app boosted the farmers to look after it during morning hours. This mobile application was a very good initiative taken in the field of

agriculture, the content present in this app was so strong and delivered the vital extension service to the farmers so the positive attributes of this uzhavan app technology could be widely used in this state.

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UTILIZATION PATTERN OF ICTS BY AGRICULTURAL EXTENSION OFFICERS

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ABSTRACT

The present study was conducted in Guntur and Krishna district of Andhra Pradesh in 2017-18. A total of 60 respondents in State department of agriculture were selected randomly. Interview schedule was used to collect the primary data and statistical techniques like frequency and percentage were used. The results revealed that most of the respondents are middle aged (56.66), having B.Sc. graduation in agriculture (51.66%), 2-4 years of job experience (48.34%), major source of information is state department officers (4.33%), cent per cent of respondents has mobile phones, received training on ICT (65%) and possess (90.00%) skills on data entry, usage of internet and MS word. Services provided through ICT are “Weather related information”(162) was found to be the major service which is frequently provided by the AEO’s using ICTs. Followed by “Marketing information of crops” (157), “Improved production technologies” (138) and “Timely advice” (124) were mentioned as critical services provided securing second, third and fourth ranks respectively. The other ICT services include “Demand for various crops” (109), “Video clips of demonstration” (101), “ voice messages” (98), “Use of digital camera for diagnostic services” (97) and “Use of computer for expert system” (89) were also ranked fifth , sixth, seventh, eighth and ninth ranks respectively.

Key words: farmers, ICT, information, utilization, weather.

INTRODUCTION

Information and communication technology (ICT) has become the most influential means of disseminating information required by the people globally. Today Andhra Pradesh is passing through the phase of communication revolution, which has brought about significant growth of media in mass communication. In the era of globalization, ICT is the most powerful resource for the widespread transfer and sharing of information. It is the convergence of media and it is perceived to have the potential to boost economic, social and political development towards the mankind as a whole. Agricultural sector has experienced a new technological revolution for the past ten years. Compared to decade earlier, this revolution has the potential to respond to farmers needs accurately and swiftly. It’s vital that farmers should receive agricultural information as fast as possible so

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that they understand, interpret, accept and utilize the information to get desired benefit. ICT could be the best solution for the spread of agricultural information and technologies. Also, farmers can use the same platform to communicate feedback on new technologies from field experiences to the agricultural officers. Furthermore, ICT has the means of creating platform that will help to break the weak linkage between farmer-extension- research.

Currently there are staffing challenges in Andhra Pradesh, as the extension officer to farmer ratio is very low at 1: 1162 (www.thehansindia.com). Also, farming communities are located far and moreover, extension services lack the needed resources to offer services to farmers in remote areas. To overcome these challenges, there a dire need to analyze the extent of ICT utilization by agricultural extension officers.

MATERIAL AND METHODS

The study was conducted in Guntur and Krishna district of Andhra Pradesh in 2017-18. Ex Post Facto Research design was used with random sampling method. A total of 60 respondents from Guntur and Krishna districts were selected @ 30 numbers per district . Data was collected through structured Interview schedule and statistical techniques like frequency and percentage were used. The major services provided by the respondents were listed and scores are given on three point continuum viz., every time (3), often (2) and rarely (1) accordingly ranks were given to the services.

RESULTS AND DISCUSSION

Age

Results presented in table 1 revealed that more than half (56.66%) of the respondents are belonged to middle age category followed by young age(25.00%) and old age (18.34%) categories. The above trend might be due to fact that, there was regular recruitment of agricultural extension officers in the present past to fill the vacant seats.

EDUCATION

A cursory look at table 1 concluded that more than half (51.66%) of the respondents has education level of B.Sc. Agriculture followed by diploma in Agriculture (40.00%) and M.Sc. in Agriculture (8.34%). Even though the minimum qualification for agricultural extension officers is diploma, due to limited opportunities for B.Sc. Agriculture under government as well as private sector majority of the B.Sc. gradates also opting for the post of AEO's.

Work experience

It is evident from table 1 that (48.33%) of the respondents are having 2-4 years of experience followed by (31.64%) having more than 4 years of experience and (20.00%) having less than 2 years of experience. The above result is due to recent recruitment to fill the long lasting posts in agricultural department. On the other side, it might be taking more years to get promotion as AO's for those who are having required qualifications.

Source of information

From table 1 it is concluded that (48.33%) of the respondents are getting information by

state department officers followed by (26.64%) from marketing officers and (25.00%) from scientists. The above results are due to fact that the higher authorities for AEO's are AO's & ADA's, so whenever they require information they go to state department official. On the other side, enthusiastic people acquiring information from scientists regarding latest technologies, varieties and innovations.

TABLE 1 : PROFILE CHARACTERISTICS OF RESPONDENTS (N=60)

S.no	Variables	Category	Frequency	Percentage
1.	Age	Young (20-35)	15	25.00
		Middle (36-50)	34	56.66
		Old (more than 50)	11	18.34
2.	Education	Diploma in Agriculture	24	40.00
		B.Sc. (Agri.)	31	51.66
		M.Sc.(Agri.)	5	8.34
3.	Job experience	Less than 2 years	12	20.00
		2 – 4 years	29	48.34
		More than 4 years	19	31.66
4.	Source of information on marketing and agriculture	State dept. officers	29	48.33
		Scientists	15	25.00
		Officers of Marketing Dept.	16	26.64
5.	Mass media exposure	Radio	15	25.00
		Television	26	43.33
		News papers	18	30.00
		Mobile phone	60	100.00
6.	Specialized training on ICTs	Received	39	65.00
		Not received	21	35.00
7.	ICT skills possessed	Data entry	54	90.00
		Internet	54	90.00
		Ms word	54	90.00
		Ms excel	45	75.00
		Power point	36	60.00

Mass media

From table 1 it is revealed that all the respondents were using mobile phones followed by television (43.33%), news papers (30.00%) and radio (20.00 %) for obtaining information. It indicated that AEO's using mobile phones rather than any mass media. It might be due to flexibility, cheaper cost and easy handling and also due to easy sharing of information anytime and anywhere.

Training

A cursory look at the table 1 revealed that more than half (65.00%) of the respondents obtained training. From the results it is indicated that they obtained their ICT training from the colleges or universities they studied, as part of their course.

Skills possessed

It is evident from the table that maximum (90.00%) number of the respondents possesses internet and aware of data entry and MS word followed by MS excel (75.00%) and power point presentation (60.00%). The above trend might be due to fact that the respondents who received training possess the skills like power point presentation and usage of MS excel. On the other side, as the respondents are graduated from universities they have basic knowledge on ICT.

Services Provided through ICT

The above table explicitly depicted that, "Weather related information" (162) was found to be the major service which is frequently provided by the AEO's using ICTs. Followed by "Marketing information of crops" (157), "Improved production technologies" (138) and

Table 2. Services provided by the Agricultural Extension Officers through ICT utilization

S.NO.	SERVICES	SCORE	RANK
1.	Weather related information	162	I
2.	Marketing information of crops	157	II
3.	Improved production technologies	138	III
4.	Advisory services	124	IV
5.	Demand for various crops	109	V
6.	Video clips of demonstrations	101	VI
7.	Voice messages	98	VII
8.	Use of digital camera for diagnostic services	97	VIII
9.	Use of computer for expert system	89	IX

"Advisory services" (124) were mentioned as critical services provided based on the ranks .

The other ICT services includes "Demand for various crops" (109), "Video clips of demonstration" (101), "voice messages" (98), "Use of digital camera for diagnostic services" (97) and "Use of computer for expert system" (89). Mostly weather related information can be provided by the AEO's through ICTs, so that farmers can adopt pro-active measures based on forecasts like saving of spraying costs, prophylactic sprays before attack of disease, timely harvesting of crops etc., ICT tools, specifically mobile applications provide information on market prices of commodities in the nearest town and also elsewhere prime markets by which they can develop an understanding of minimum and maximum prices. This helps the farmers to market the produce during low seasons. AEOs provide information on latest crop production technologies such as new varieties of crops ,IPM,INM technologies developed in research. They also rovides information on marketing of produce, government development programmes, distribution of inputs. Provides timely advice through personal calls , SMS and MMS services.

CONCLUSION

ICTs play an important role in delivering the information with in no time . ICTs helps in meeting information thrust of farmers for new approaches. It also helps in empowering the rural people by providing better access to needy resources, improved agricultural technologies, effective production strategies, marketing and financial services. Application of computer software and ICTs in agriculture can help to achieve new heights for sustainability and precision agriculture.

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A STUDY ON ROLE OF LEGAL AWARENESS OF FARM-BASED AGRI-INPUT ENTERPRENEURS ON MANAGEMENT OF AGRI ENTERPRISES IN CENTRAL-TELANGANA REGION

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ABSTRACT

More than half (51.42%) Agri enterprises are established units in agriculture and allied sectors established in rural areas (source: Annual report MSME 2020-21). Core thrust of research is to recognize about the legal awareness on Agri input enterprises like seeds, pesticides and fertilizers and their impact on rural people. Exploratory and *Ex-Post-Facto* research design was followed for the study. The study was conducted in Sanga Reddy district of central Telangana purposively as it is having maximum number of Agri-enterprises in the state. The conclusions of the study revealed that an overwhelming (97.50%) possess medium level of legal awareness on farm based agri inputs related information, followed by high level (2.5%) of awareness.

INTRODUCTION

Farm based enterprise means the business of producing crops, livestock products and aquatic organisms through the utilization and management of land, water, labor, capital, and basic raw materials including seed, feed, fertilizer, and fuel. India in order to remain a front-runner needs to primarily emphasis on agricultural sector, the backbone of the economy. This specialism will-develop-Agri-preneurs-with distinct characters and skills to explore chances abundant in the field of agriculture. Among the various approaches to encourage planned growth in this sector, focus on encouraging worthwhile farm based agri-input enterprises will certainly help exploit its operational efficiency to handle. It is a long held view that innovation in the farming sector in India has progressed since the green revolution of the 1960s and 1970s, the drastic change in that period brought high yielding varieties of seeds along with major improvement in irrigation methods and soil nutrition etc it is a common argument that farmers in India continue to follow the paradigm established by the green revolution even today despite the circumstance that natural and economic factors demand revolutionary changes in the agricultural sector once again.

Farmers are the direct handlers of pesticides and more like to get severe toxicity of pesticides. The chronic toxicity effect entire populace. Farmers were unaware of precise usage of such agro chemicals, they are directed

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by agri input dealers and retail channels of agri inputs. Here the role performance of farm based agri-input enterprise and the agripreneurs great important for quality supply of agricultural inputs and appropriate recommendations for the diseases and pests of the crops.

The present study was carried with the key objective to find out the awareness level of legal process for creation and running of farm-based enterprises among the farm based agripreneurs.

MATERIALS AND METHODS

The study was conducted in Sangareddy district of central Telangana purposively as it is having maximum number of Agri-enterprises in the state. From Sangareddy three revenue

Number of farm-based enterprises in study-area

S.NO	Revenue-Divisions	Mandals	No of FBEs*
1	**Narayankhed revenue**	1. Kalher	08
		2. Kangti	18
		3. Manor	10
		4. Nagilgidda	06
		5. Narayankhed	32
		6. Sirgapoor	05
2	**Sangareddy-revenue**	7. Ameenpur	03
		8. Andole	11
		9. Gummadidala	09
		10. Hathnoora	09
		11. Jinnaram	06
		12. Kandi	0
		13. Kondapur	02
		14. Munipally	13
		15. Patancheru	06
		16. Pulkal	09
		17. Ramchandrapuram	03
		18. Sadasivapet	35
		19. Sangareddy	10
		20. Vatpally	14
3	**Zaheerabab-revenue**	21. Jhara sangam	11
		22. Kohir	14
		23. Mogudampally	03
		24. Nyalkal	14
		25. Raikode	24
		26. Zahirabad	22
	Total		200

***Farm Based Enterprises**

RESULT AND DISCUSSION

a) Awareness level on seed related information

Table-1: Distribution of farmers on the basis of their awareness-level on seed-related-information (n = 200)

S.No.	Seed related information statements	Awareness level									
		Aware		Partially aware		Not aware		Using		Not using	
		f	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Protection of plant varieties and farmers rights certificate of registration shall-be valid for 6-years for crops, 9-years for tree species	7	3.5	2	1	191	95.5	0	0	200	100
2	Seed act 1966 provide for establishment of seed certification agencies to certify seeds	5	2.5	3	1.5	192	96	10	5	190	95
3	Seed-certification agency should serve the interest of seed-producers and farmers/users	3	1.5	1	0.5	196	98	6	194	3	97
4	export, import of seeds and planting material are governed by the EXIM-policy 2002	3	1.5	2	1	195	97.5	9	4.5	191	95.5
5	All-imports of seeds and planting material would be regulated under the plant-quarantine order 2003	2	1	1	0.5	197	98.5	9	4.5	191	95.5
6	National seed corporation is the largest single-seed-organization in the country	2	1	3	1.5	195	97.5	9	4.5	191	95.5
7	The registration of new plant varieties by the PVP	2	1	0	0	197	98.5	8	4	192	96

	authority will be based on the criteria of Novelty, Distinctiveness, Uniformity, Stability.										
8	Seed regulation order 1983 frame rules for the sale of certified seeds of declared crops and their varieties	2	1	0	0	198	99	8	4	192	96
9	"Seed village scheme" promoted to facilitate production and timely availability of seeds of crops/varieties at the local level	2	1	0	0	198	99	8	4	192	96
10	National Seed Grid established as a data base for monitoring of information on requirement of seed its production and distribution preference of farmers	1	0.5	0	0	199	99.5	10	5	190	95
11	National seed board can direct a dealer to sell or distribute seeds in a specified manner in a specified area	0	0	0	0	200	100	5	2.5	195	97.5

Table-2: Overall awareness-level of respondents on seed-related-information (n=200)

S. No.	Level of awareness	Response		
		Frequency	Percent	
1	Low	0	0	$\bar{x}$= 11.35
2	Medium	187	93.5	σ =2.01
3	High	13	6.5	

Table 3: Distribution of farmers based on their awareness level on insecticide related information (n = 200)

S. No.	Statements documents required for applying licenses	Awareness level									
		Aware		Partially aware		Not aware		Using		Not using	
		f	%	*F*	%	*f*	%	*f*	%	*F*	%
1	Insecticide's act 1968 is to regulate-import, manufacture, sale, transport and distribution and use of insecticides	4	2	0	0	195	97.5	6	3	194	97
2	Any Insecticide sale, use of which is for the time-being prohibited under the section-27	2	1	0	0	198	99	2	1	198	99
3	Insecticide-analyst-appointed under section 19 of Insecticide act 1968	2	1	1	0.5	197	98.5	0	0	200	100
4	Insecticide-inspector-appointed under section 20 of Insecticide act 1968	3	1.5	2	1	195	97.5	0	0	200	100
5	Licensing officer appointed under section 12 of Insecticide act 1968	3	1.5	2	1	195	97.5	0	0	200	100
6	Destructive insects, pests act-1914 are to prevent the introduction into transport from one state to another in India of any insect, fungus and other pests which may destructive	3	1.5	2	1	195	97.5	0	0	200	100
7	Insecticides rules 1971 are powers conferred by section 36 of the Insecticide act 1968	2	1	0	0	198	99	1	0.5	199	99.5
8	Insecticides rules 1971 classification of insecticides on the basis of their toxicity As well as their suitable for	0	0	2	1	198	99	38	19	161	80.5

(Table 3 Contd.)

	aerial application										
9	Plant quarantine order 2003 regulates imports and prohibition of imports of plant And plant products into India	2	1	2	1	196	98	0	0	200	100

Table.4. Overall awareness level of respondents on Insecticide related information

(n = 200)

S. No.	Level of awareness	Response		$\bar{x}$= 9.26
		Frequency	Percent	
1	Low	0	0	
2	Medium	195	97.5	σ =1.72
3	High	5	2.5	

c) Awareness level on Fertilizers used

Table 5: Distribution of respondents based on their awareness level on fertilizers used

(n = 200)

S.No.	Fertilizers used related information statements	Awareness level									
		Aware		Partially aware		Not aware		Using		Not using	
		f	%	*f*	%	*f*	%	*f*	%	*f*	%
1	Fertilizer control order 1983 is to regulating sale, price, distribution and quality of fertilizers	4	2	2	1	194	97	0	0	200	100
2	New-urea policy-2015 is for maximizing indigenous urea production promoting energy efficiency in urea production and rationalizing subsidy burden on government	4	2	1	0.5	195	97.5	0	0	200	100
3	New investment policy 2012 is to	4	2	2	1	194	97	0	0	200	100

(Table 5 Contd.)

	facilitate fresh investment make India self and reduce import dependency in urea sector										
4	Nutrient based subsidy policy 2010 under this policy a fixed rate of subsidy is announced on nutrients namely N, P, K, S	2	1	2	1	196	98	1	0.5	199	99.5
5	Government of India declared fertilizer as an essential-commodity under essential-commodities act 1955	2	1	0	0	198	99	5	2..5	195	97.5
6	Any person manufacturer, whole seller, and a retail dealer intended to sell fertilizer shall make a memorandum of intimation to notified authority in form A1	5	2.5	0	0	195	97.5	1	0.5	199	99.5
7	Form A is application to obtain dealership certificate and form A1 is memorandum of intimation	2	1	2	1	196	98	4	2	196	98
8	Form D is the application to obtain a certificate of manufacture of physical/granular mixture of fertilizer/organic fertilizer/bio fertilizer/non edible de-oiled cake fertilizer	2	1	2	1	196	98	0	0	200	100
9	Form N for stock register to be maintained by dealer/manufacturer/importer/pool handling agency	6	3	0	0	194	97	4	2	196	98
10	Form O is Certificate of source for carrying on the business of selling fertilizers in wholesale/retail/industrial use	146	73	2	1	52	26	26	13	174	87
11	Agricultural produce, livestock marketing act-2017 seek to promote direct Interface between-farmers, processors/exporters	87	43.5	0	0	113	56.5	2	1	198	99

Table.6. Overall awareness level of respondents on fertilizers used related information

(n = 200)

S. No.	Level of awareness	Response		$\bar{x}$= 13.71
		Frequency	Percent	
1	Low	47	23.5	
2	Medium	143	71.5	σ =2.49
3	High	10	5	

divisions namely Zahirabad, Narayanakhed and Sanga Reddy were chosen purposively and from each revenue division Nine blocks were selected purposively thus making up a total of 27 blocks. From each block 7-8 respondents were interviewed and collected data with help of specially designed interview schedule thus constitutes a total of 200 farm based Agri-input entrepreneurs. Exploratory and *Ex-Post Facto* research design was adopted for the study. It was measured by providing a list of legal procedures in establishment of enterprise to the agripreneurs and their response is recorded in a five-point continuum scale ranging from aware, partially aware, not aware, using and not using. Based on the scores obtained by the respondents, they were classified into low, medium and high keeping the mean and standard deviation as check.

RESULTS AND DISCUSSION

From Table.6. it revealed that nearly three-fourth of the farmers (71.5%) had medium level of awareness on fertilizers used, followed by low (23.5%) and high (5%) level of awareness on fertilizers used.

Increased mass media exposure, good-extension-contact and better sources of information lead to increased awareness on fertilizers used. Similar studies were reported by Anitha (2005), Sarda and Gill (2005), Sharma et.al., (2014) and Prajapati et.al., (2015).

CONCLUSION

Most of the farmers had medium awareness level (93.5%), followed by high awareness level (6.5%). None of them had low level of awareness on seed related information. most of the farmers had (97.5%) had medium awareness level on insecticide related information, followed by high level (2.5%) of awareness. More than two-third of the respondents (71.5%) had medium awareness level on fertilizers used, followed by low (23.5%) and high (5%) level of awareness on fertilizers used.

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A CASE STUDY OF A SUCCESSFUL FLORICULTURE NURSERY OWNER IN KADIYAM MANDAL OF ANDHRA PRADESH

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ABSTRACT

Kadiyam nurseries located in the coastal area under Kadiyam Mandal of East Godavari district, on the banks of river Godavari were the sky-high of the floriculture nursery industry occupying the prestigious position in the International map with long-lasting history of 100 years spread over 1555 hectares of land comprising a combination of small, medium and large nurseries. Entrepreneurial behaviour was found to be influencing the trademark of floriculture nurseries at Kadiyam. On this consideration, the present study has been explored through the in detailed case study of a floriculture nursery owner. This study revealed the life transformation of Pulla Satyanarayana, a 60 years old man and Managing Director of Sri Satya Deva Nursery, hailed from the Kadiyam village, Kadiyam mandal in East Godavari district, He studied up to 5th Class and had entered into this family occupation at age of 16and started involving in every aspect of the nursery enterprise right from production to marketing. Nursery which was started in one acre during his childhood has been increased by fourfold after 15 years providing employment to 300 men and 150 women unskilled labour and 50 men skilledlabour with good wages and additional incentives. He for his remarkable services has also achieved many awards. Satyanarayana was not only the managing director of Satyadeva nursery but was also the president of Sir Author Cotton Nursery Farmers Associations, catering his services to all the nursery owners under this association with help of government and non-government agencies by providing free electricity, conduction of training programmes, demonstrations etc. Satyanarayana during this investigation stated that it was his father who has showed them a way towards future and it was their responsibility to spread the greenery to all parts of India and make the nursery a remarkable enterprise forever.

INTRODUCTION

Nowadays nursery raising is becoming one of the remunerative enterprise in horticulture sector since the demand for high-quality planting material is steadily increasing due to interest and passion of the people in vegetable gardening, fruit tree cultivation, social forestry, agro-forestry and plantation crops by lending huge investment to relish their day to day life (Palve 2003)Kadiyam nurseries, the brand value of floriculture nursery industry in Andhra Pradesh are at sky high with about 1500 floriculture

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nurseries in a single mandal in an area about 1555 hectares of land comprising a combination of small, medium and large nurseries with wide variety of indoor plants, outdoor plants, seasonal plants, ornamentals plants, medicinal plants, fruit crops etc. ranging from 5 rupee to thousands of rupees and out of its total production 50-60 per cent of the plants get exported to other states and countries. (Anonymous, 2018). Literally, kadiyam nurseries are trying to become the source of new generation plants that are innovative and unique to the customers. Thus, considering the importance of nursery owners in the horticultural growth and development, it was felt necessary to conduct a case study on one of the successful nursery owner at Kadiyam.

METHODOLOGY

The present study was conducted in the year 2018-19 and Case Study method was followed in the present investigation. Case study helps to explain both the process and outcome of a phenomenon through complete observation, reconstruction and analysis of the cases under investigation. Kadiyam Mandal of East Godavari district in Andhra Pradesh is purposively selected for the study as the locale is nationally and internationally known for commercial floriculture nurseries and was dominant with more area under floriculture. The study was conducted for a day with a successful floriculture nursery owner. The nursery owner was interviewed personally and data was recorded as per the nursery owner response.

RESULTS AND DISCUSSION

Profile of the nursery owner:

Sri Pulla Satyanarayana, aged 60 years old, present managing director and son of the originator of the Sri Satyadeva nursery, hailed from Kadiyam village in East Godavari district of Andhra Pradesh. He was brought up in a joint family system where his father was a tenant farmer at his childhood and was used to carry the plants using shoulder carrying pole from Kadiyam to different places of the state with countless difficulties and later with his hard work and sincerity his father have become independent farmer and started nursery named Sri Satyadeva in an area of 1 acre by the time Satyanarayana completed his primary education.

Seeing the family economic situation and also being interested towards the propagation of plants and developing new plants, Satyanarayana has left his education after primary school and with no training, started assisting his father and elder brother at age of 16 in every aspect of the nursery enterprise right from production to marketing by learning from them. Not only he has entered into his family occupation but also motivated his younger brothers and other family members to enter into this family occupation. Nursery which was started in one acre during his childhood has been increased by fourfold after 15 years of his entry into this business, but there was sudden shock to his family of his elder brother demise who had acted as pillar to Satyadeva nursery supporting his father in every aspect of nursery. This situation has led Satyanarayana to be more supportistic to his father and run the business in smoothful way by taking the role of his elder brother. Since from that day he has kept all his efforts in the nursery upliftment along with the help of younger brothers and father and made Satyadeva nursery as one of the biggest nurseries in India producing good quality of plants.

Satyanarayana is such a person with no sign of discrimination, works day and night along with workers to feed and protect the plants. Satyanarayana, as a managing director was not only profit oriented but was also keenly interested in providing employment to the workers in his village coming from similar background. Satyadeva nursery which was started in 1 acre in the year 1950, is now spread in 80 acres of land producing thousands of varieties of plants exporting them to different parts of the country and world with the main aim of spreading greenery.

Apart from nursery business, he had now spread his nursery services to airports, plant gift shops and galaxy pot shops with the thoughts of young children of his family who completed their education in life sciences. Also, under the guidance and leadership of Satyanarayana, 18th AICRP meeting on tropical fruits was held at Satyadeva nursery and recently a new plant named gold chain was released even though its risk oriented. He was not only the managing director of Satyadeva nursery but was also the president of Sir Author Cotton Nursery Farmers Associations, catering his services to all the nursery owners under this association with help of government and non-government agencies by providing free electricity, conduction of training programmes, demonstrations etc. Satyanarayana during the research investigation stated that it was his father who has showed them a way towards future and it was their responsibility to spread the greenery to all parts of India and make the nursery a remarkable enterprise forever.

Table 1: Profile of the nursery owner:

Name of the nursery owner	:	Sri Pulla Satyanarayana
Name of the nursery	:	Sri Satyadeva nursery
Age	:	60 years
Education	:	Primary school education
Land holding	:	80 acres
Experience in nursery business	:	40 years
Marketing pattern	:	Customers, traders, other nurseries in Kadiyam, agents of other states and direct export to other states and countries
Source of credit	:	Nationalized banks
Mass media exposure	:	Regularly viewing television Regularly reading newspaper and publications related to nurseries
Social participation	:	President of Sir Author Cotton Nursery Farmers association
Extension contact	:	Regularly contact with Department of Horticulture, Scientists of YSRHU, Bank officials, and Fellow progressive nursery owners

Unique features of the nursery

In Sri Satyadeva nursery there were several unique features observed such as best quality production of plants, experienced team good condition of the plants through services of best consultants in horticulture field, best loading process without any damage to the plants, clean and weed farm, best receiving of customers and best hospitality to them and finally best experts for further suggestions to the customers. Till date this nursery had 45 years of experience, successfully completing more than 2000 projects and received 21 awards

Awards and achievements

1. Best nursery award by Sri. A.R. Sukumar, Horticulture commissioner, in 1997
2. Udyanavana Sastra Praveena Award from Mr. Hari Babu in 2001
3. Best nursery award from Dr. Y.S. Rajasekhara reddy in 2005
4. Mother Theresa award from P.V. Ranga Rao in 2006
5. Mega Nursery Man award from Padmabhushan Dr. Chiranjeevi in 2009
6. Best Big Nursery award -2011 from Central minister Shri Sharath Pawar
7. Hariyali Ratna award and cash prize from Shri Narendra Modi
8. Best Nursery Men award-2015 from Shri Nara Chandra Babu Naidu

Products and services available in the nursery

Satyadeva nursery produces a wide variety of ornamental plants, seasonal plants, creepers, shrubs, crotons, fruit and flowering plants, tree

Table 2: Most demanded plants in different seasons

Seasons of sale		
S. No.	**Category**	**Most demanded plants**
1.	Summer	Ornamental plants
2.	Winter	Seasonal plants
3.	Rainy	Fruit plants
4.	Autumn	Seasonal plants
5.	Throughout the year	Ornamental plants, Royal palms and Fox tail palms
Imported and exported plants		
S. No.	**Category**	**Most demanded plants**
Imported plants		
1.	Within India	Bougainvillea, Seasonal from west Bengal and Maharashtra and some of the fruit plants such as coconut and guava from Kerala
2.	Outside India	Ficus , Bougainvillea and Olive Species from countries like Thailand, china, Malaysia and Europe
Exported plants		
1.	Within India	Fruits and ornamentals to states like Tamilnadu, Maharashtra, Rajasthan, Gujrat, Kerala and Kolkata
2.	Outside India	Ornamental plants to countries like Europe, Malaysia and Dubai

varieties, palms etc. Among them some of the plants are in demand at particular season only whereas some plants throughout the year, followed by some of the plants being exported from other states and countries and some plants being imported to other states and countries

Table 2: Most demanded plants in different seasons

Exported plants

1. Within India Fruits and ornamentals to states like Tamilnadu, Maharashtra, Rajasthan, Gujrat, Kerala and Kolkata
2. Outside India Ornamental plants to countries like Europe, Malaysia and Dubai

Contribution for employment generation.

Employees first, customers next was the major philosophy being followed by this nursery from long ago. This nursery usually hires both unskilled and skilled workers for their nursery upliftment and as of now 300 unskilled men and 150 unskilled women workers were employed followed by more than 50 men skilled workers. Satyadeva nursery utilizes unskilled men workforce for planting, application of fertilizers and pesticides, irrigation and transportation of plants with a daily wage of Rs 600/- where as unskilled women workforce for weeding, irrigation to smaller plants and mainly for packaging of plants with a daily wage of Rs. 250/-

Apart from this unskilled workers, more than 50 skilled men workers were present who are mainly concerned for development of new varieties and propagating them, supervision of the work being undergone, and also for trading purpose with a monthly salary of Rs. 20,000. The main specialty of this nursery was that never the nursery owner burden their workers with lump sum work but rather make them work tension free and implement new ideas in the nursery. Satyadeva nursery usually identifies individuals who were performing well in their nursery and congratulate them with bonus salary and promotions

Marketing network of Satya Deva Nursery

Satyadeva Nursery was not only involved in production but also the best marketing network through involvement of several components such as source of identification of nursery, method of sale, kinds of payment in sale, mode of day to day communication, delivery options, customers profile and promotional strategies.

Among the source of identification of nursery, customers themselves identifying the nursery was the major contributing factor and with respect to method of sale and kinds of payment in sale,majority of orders are through in person orders through direct cash payment followed by telephonic orders. The nursery owner also highlighted that more than three-fifth of the customers who visited his nursery were diversified customers and he usually use telephonic calls, E-mails, or any other digital platforms for mode of day to day communication about the plants availability. With respect to the promotional strategy, good quality plants and packaging, followed by highway targeting were the crucial components helping the nursery into one of the biggest supplier of plants in India today.

Reflections from the nursery owner to components of entrepreneurial behaviour:

- He was the first person to establish a plant gift shop in an airport to welcome the visitors who visit to that particular city. (Innovativeness)

- Since Satyanarayana was in a joint family, a better decision ability was carried out with the help of his family members in the selection of plants during the time of heavy marketing distress in Kadiyam. (Decision making ability)
- Satyanarayana along with the help of his brothers acted as organizing member in conduction of 18th Annual group meeting of AICRP on tropical plants in his nursery to help other nursery owners in Kadiyam (Leadership ability)
- Even though it's not climatically suitable for propagating gold chain plant in Kadiyam, Satyanarayana has taken the risk to introduce that plant in Kadiyam and had succeeded in propagating it and distributing to other nursery owners in Kadiyam (Risk orientation)
- In Satyadeva nursery each section of plants was allocated with one supervisor and ten employees consisting of workers, quality maintainer, marketing person etc. so that easy planning and execution of an idea will be done for the overall development of nursery (Management orientation)
- Satyanarayana was the first person to replace the earthen pots with polythene covers for easy packing and transport of the plant (Scientific orientation)

CONCLUSION

It can be concluded from this case study that, the nursery owner is interested to carry out the nursery business in multidimensional pathway as it is generating good income and providing persistent employment to large number of people in the entire year. The study revealed that nursery owner acquired entrepreneurship skills like innovativeness, management orientation, scientific orientation, risk orientation, leadership ability and decision making ability by venturing into nursery sector.

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ADOPTION OF SOIL HEALTH CARD RECOMMENDATIONS BY THE FARMERS IN EAST GODAVARI DISTRICT OF ANDHRA PRADESH

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ABSTRACT

The Present study was conducted to know the adoption of soil health card recommendations, correlates of adoption and constraints in adoption through purposive sampling of 200 respondents selected from East Godavari district. The data collected through structured interview schedule employing ex-post facto research design. The results showed that majority of respondents had medium level of adoption. The Correlation coefficients of occupation and family size has significant positive correlation with adoption. With regard to constraints in adoption, respondents expressed that lower yields with adoption of soil health, card recommendations, lack of faith in the results presented in soil health cards and delay in issuing soil health cards were the major constraints. In order to improve the adoption of soil health card recommendations, practical demonstrations to be organized on large scale.

Key Words: Soil Health Card, Adoption, SHC, Correlates, Constraints

INTRODUCTION

Healthy soils produce healthy crops that in turn nourish people and animals (FAO, 2015). Soil health is proposed to focus on the maintenance of four key functions: carbon transformation; nutrient cycles; maintenance of the soil structure; and control of pests and diseases (Kibblewhite et al., 2007). Soil is one of the natural resources that support human civilization. Without a productive and healthy soil, the prospective of producing enough food to feed an ever-increasing human population. Healthy soil contain all the elements for growth and development of crops or the soil deprived from one or more nutrient either reduce the production or degrade quality of crops. As far as agriculture production is concerned, soil health play vital role in ensuring sustainable production with optimizing the utilization of fertilizer and reducing its waste. Most of the chemical fertilizers to increase production without knowing the fertility status of the soil of their fields (Srivastava and Pandey, 1999).

Soil testing is well recognized as a sound scientific tool to assess inherent power of soil to supply plant nutrients. The benefit of soil testing have been established through scientific research, extensive field demonstrations and on the basis of actual fertilizer use by the farmers

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on soil test based fertilizer use recommendations. Neufeld and Davison (2006) stated that soil testing is only necessary and available tool for determining the amount of soil nutrients. The soil health card is a simple document which contains useful data on chemical analysis of the soil to describe soil health intern of its nutrient availability and its physical and chemical properties. Soil health card can be used to optimize the use of fertilizer in the integrated nutrient management system. Since, change in knowledge preceded acceptance and application of an innovation, it is therefore, always important to findout the factor responsible for positive or negative disposition associated with farmer towards the usefulness and application of soil health card recommendation. (G.G. Patel et al. 2019).

Hence, present study was under taken to know the Adoption of soil health card recommendations, correlates of adoption with profile characteristics of farmers and constraints in adoption of soil health recommendations.

MATERIALS AND METHODS

The study was conducted in the East Godavari district of Andhra Pradesh State during the year 2019-20. Ex-post facto research design was employed 200 respondents were selected.The questionnaire was prepared in Telugu language with a view to study and collect data through personal interview of the selected respondents. The data were tabulated and analyzed with the objectives to draw the meaningful conclusion.

For the present study, With regard to adoption, 6 statements with two point continuum with the score of adopted 2 and not adopted 1 was given for respondents. For assessing the constraints faced by the farmers in adoption of soil health card recommendations, a response was recorded in the schedule itself. The frequency and percentage for each were worked out and rank was given based on frequency and percentage. The respondents were grouped into three categories viz., Low, medium and high on the basis of Mean + S.D. Other statistic tool like Correlation has applied to draw the relationship between profile characteristics and adoption.

RESULTS AND DISCUSSION

The data presentation table 1 reveal that majority of the farmers (69 per cent) had medium level of adoption followed by high (18.5 per cent) and low level (12.5per cent) adoption.

Table 1. Adoption behaviour of farmers towards Soil health card recommendations: (n=200)

S.No	Department Variable	Category	Frequency (No.)	Percentage (%)
1.	Adoption Mean= 8.2; SD= 1.8	Low (<6.4)	25	12.50
		Medium (6.4 to 10)	138	69.00
		High (>10)	37	18.50

Table 2. Impact of application of SHC recommended dosages of fertilizers on productivity of different crops:

S. No.	Crop	Season	Average Yield (q/ha.)		% yield increase over non beneficiary
			SHC farmers n=175	Non-SHC farmers n=25	
1	Paddy	Kharif	6762	6530	3.6
2	Blackgram		1815	1729	4.9
3	Greengram		1297	1198	8.3
4	Maize		10,164	9794	3.8

Over all, low to medium level of adoption was seen with majority (81.5 per cent) of the respondents. The reason behind this might be due to their unawareness about the benefitsof optimum fertilizer use to improve their net income as well as ill effects of excess fertilizer application to the environment. The results are in agreement with Vignesh kumar and Janaki rani (2018).

Results from Table 2 on the productivity of different crops cultivated by the SHC and non-SHC farmers depicted that on par average yields of major crops such as Paddy, Blackgram, Greengram and Maize during Kharif season were recorded. The per cent increase in yield over non SHC respondents in Paddy was 3.6 per cent,Blackgram (4.9 per cent), Greengram (8.3 per cent) and 3.8 per centwith regard to Maize crop was recorded in SHC beneficiary fields as against non SHC beneficiary fields. This slight increase might be due to not only the fertilizer management but also other management factors. Though there was on par yields, with judicial use of fertilizers as per the SHC recommendations thedeclined cost was observed with respect to fertilizer application in SHC beneficiary fields as against non-SHC beneficiary fields with a difference of Rs. 2,593.5/- in Paddy and Rs. 3,334.5/- in Maize per hectare.This ensures that application of SHC recommended dosages not only maintains good soil health but also endeavors sustainable agriculture. The results are in agreement with the findings of Manimekalai etal. (2021).

With regard to recommended organic manures as per soil health card results, 80.5 percent of the respondents not adopted while 19.5 percent of respondents adopted (Table 2).

From Table 3 it is found that 76 percent of respondents had not adopted recommended nitrogen as per soil health card results followed by 24 percent of respondents adopted. As regard to recommended phosphorus as per soil health card results, 63 percent of respondents not adopted where as 37 percent of respondents were adopted.

It was also revealed from Table 3 Nearly three fourth (72.5 per cent) of the respondents were not adopted recommended potash as per soil health card results, where as only 27.50 percent of respondents adopted this recommendation.

The data presented in Table 3 reveal that majority micronutrients as per soil health card results and 20.50 percent were not adopted this practice. With regard to recommended gypsum

Table 3. Statement analysis of adoption behaviour of farmers towards Soil health card:

(n=200)

S. No.	Item	Adopted		Not adopted	
		Frequency (No.)	Percentage (%)	Frequency (No.)	Percentage (%)
1.	Recommended organic manures as per SHC results	39	19.5	161	80.5
2.	Recommended nitrogen as per SHC results	48	24.0	152	76.0
3.	Recommended phosphorus as per SHC results	74	37.0	126	63.0
4.	Recommended potash as per SHC results	55	27.5	145	72.5
5.	Recommended micro nutrients as per SHC results	159	79.5	41	20.5
6.	Recommended gypsum/lime as per SHC results	45	22.5	155	77.5

/ lime as per soil health card results 77.50 percent of respondents were not adopted.

From (Table 4) it was evident that the computed 'r' value between extension contact had positive and significant relationship while family type had negative and significant relationship with their perception about soil health card recommendations. The probable reason for this might be that the extension contact of respondents increase the understanding ability of farmer and also easily perceive the scientific facts which increase their level of perception. The other dependent variables like age, caste were non significant negative correlation observed with perception of farmers about soil health card recommendations where as education, occupation, farming experience, land holding, annual income, source of information, family size and social participation were found non significant positive correlation with perception of soil health card recommendations among farmers.

Further, it was evident that the computed 'r' value of occupation has highly significant positive correlation and family size had positive significant correlation observed with adoption of

Table 4.Factors influencing the adoption of soil health card recommendations.

S.No	Variable	Correlation co-efficient 'r' value Adoption
1.	Age	0.023^{NS}
2.	Education	-0.135^{NS}
3.	Occupation	0.207**
4.	Caste	-0.003^{NS}
5.	Farming experience	-0.090^{NS}
6.	Land holding	0.018^{NS}
7.	Annual Income	-0.010^{NS}
8.	Source of Information	-0.010^{NS}
9.	Family size	0.156*
10.	Family type	-0.093^{NS}
11.	Social participation	0.085^{NS}
12.	Extension contact	0.047^{NS}

** Significant at 1per cent level of significance; * Significant at 5 per cent level of significance; NS-Non-Significant at 5per cent level of significance

soil health card recommendations, where as age, occupation, land holding, social participation, extension contact had positive no significant correlation and education, caste, farming experience, annual income, source of information and family type had negative non significant correlation with the adoption of soil heath recommendations.

The perusal of data (Table 5) revealed that the respondents expressed that lower yields with adoption of soil health card recommendations (77per cent), lack of faith in the results presented in soil health cards (65per cent), delay in issuing of soil health cards (51per cent), not able to understand the results given in soil health cards (30.5per cent) and non issuance of new soil health cards (26per cent), being tenant farmers, it is difficult to follow soil health card recommendations (24per cent) and non-availability of green manure crop seed to the farmers (22.5per cent) were the constraints in adoption of soil health card recommendations. The results are in agreement with the results of Mukati et al., (2018).

In order to overcome the constraints, the suggestions expressed by the farmers are issuance of Soil Health Cards in time to the farmers, create awareness about Soil Health

Table 5. Constraints faced by the farmers in adoption of soil health card recommendations: (n=200)

S. No	Constraint	Frequency (No.)	Percentage (%)	Rank
1.	Not able to understand the results given in soil health cards	61	30.50	IV
2.	Lower Yields with adoption of soil health card recommendations.	154	77.00	I
3.	Lack of faith in the results presented In soil health cards.	130	65.00	II
4.	Delay in issuing soil health cards	102	51.00	III
5.	Non issuance of new soil health cards	52	26.00	V
6.	Being tenant farmers, it is difficult to follow soil health card recommendations	48	24.00	VI
7.	Non-availability of green manure crop seed to the farmers	45	22.50	VII

Cards to the farmers through training & awareness programmes, collection of soil samples at individual level or in small grids and to conduct result demonstrations at farmers level to make farmers to adopt the SHC recommendations.

CONCLUSION

The study reveled that the majority respondents showed medium level of adoption. The finding regarding adoption of recommended organic manures as per soil health card recommendations, 80.50 percent of the respondents not adopted. It was also found that adoption was affected by occupation and family size. The adoption of soil health card recommendations by the respondents was affected by the constraints.i.e., lower yields with adoption of soil health card recommendations, lack of faith in the results presented in soil health cards and delay in issuing soil health cards etc. Inorder to improve the adoption of soil health card recommendations, practical demonstrations to be organized on large scale, awareness meetings on interpretations soil health cards are needed.

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