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EDITORIAL

Startups have begun to fascinate youth. The growing reforms and opportunities in economic system have provided impetus to the mushrooming of start ups. Even farmers have taken bold steps in establishment of their company through their innovative ideas and business models. Many farmers who have been entrepreneurial have become successful achievers. Entrepreneurial opportunities and special government provisions are helping development of agri-based enterprises. A start-up, to be successful, requires a unique concept, capabilities, capital and culture. Investments, grants, equity financing schemes, incubator schemes, debt financing and tax incentives, are the measures adopted by various nations to attract innovative start-ups. The National Science and Technology Entrepreneurship Development Board, Government of India too has laid emphasis upon technology business incubators. Atal Innovation Mission (AIM) is Government of India's flagship initiative to promote a culture of innovation and entrepreneurship in the country. AIM aims at development of Atal Incubation Centres to nurture innovative start up businesses. Lead has been gained in establishment of incubation centres as well as development of start ups. However, scaling up of startups and high rate of mortality of startups are matter of great concern. Eric Ries, a programmer by profession, in his book, "The Lean startup" has emphasized upon lean thinking. The philosophy of lean thinking is based on principles from classical management and newer concepts of lean manufacturing, and customer development. He states that startups need management skills. According to him, perseverance, hard work and creative mind are not the only factors of success, management principles too are vital. It suggests integration of vital dimension of management skills in any training programme for promotion of agri-based enterprises. It is crucial for extension organizations to impart management skills to farmers and youth to effectively manage the resources including human resources of startup, enterprise or farmers producers companies. With lean startup one can build big business ventures.

I extend my sincere thanks to all the authors to present the outcome of extension endeavors with empirical evidence and suitable research design. I also extend sincere thanks to all the expert members in the editorial board.

Special thanks are extended to the President, ISEE; Dr US Gautam for providing insightful thoughts and guidance in bring out this issue.

Dr Bhanu Mishra deserves special thanks for making committed efforts in compiling and thorough editing of the papers.

(Rabindra Nath Padaria)

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Attitude of Vegetable Growers Towards Mitigating the Ill-effects of Agricultural Chemicals

Manunayaka G.*, S. Ganesamoorthi and Shashikant Goyal

ABSTRACT

The study was conducted in Kolar district of Karnataka state during 2018-19 to ascertain the attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals. The data was collected from 120 vegetable growers in Kolar and Malur talukas through simple random sampling technique and pretested interview schedule. Out of the 14 independent variables chosen for the study, variables like education, risk orientation, extension participation, mass media exposure, and extension contact had positive and significant association with attitude. Other variables like age, family size, annual income, size of land holding had no significant association with their knowledge on the effects of agricultural chemicals. The co-efficient of determination (R^2) of the independent variables was 0.790 which means that 79.09 per cent of the total variation in the attitude level was explained by the 14 selected independent variables.

Keywords: Effects of agricultural chemicals, Knowledge, Vegetable growers

INTRODUCTION

Vegetables are a rich source of minerals and high in nutrition value and are being grown in almost all the states in the country under varied agro-climatic and soil conditions in plains as well as hilly regions. Every year in India 35-45 per cent of agricultural produce is lost due to pests and diseases besides post-harvest losses. Further the rising population and decreasing arable land is stressing greater demand for increasing food production. These conditions necessitate ensuring higher production by applying all available technological options including use of agricultural chemicals. In the recent past, efforts have been made to increase the production of vegetables by developing large number of high yielding, good quality and disease resistant varieties/hybrids and other required cultivation packages. These high yielding varieties/hybrids are more input responsive. Our ancestors had followed farming practices which were eco-friendly and used inputs available on the farm itself to grow the crops. Later,

use of agricultural chemicals as the major technological option to ensure crop productivity and even reducing post-harvest losses got impetus and it was considered as a boon for the sector.

The use of high yielding varieties (HYVs) has promoted the use of fertilizers and pesticides without paying attention to adequate dosage, proper application method and waiting times. However, the haphazard use of fertilizers and pesticides gradually leads to many dangerous environment and human impacts. Pesticides have been carelessly used which has led to the death of individuals, livestock, birds and other non-target organisms. Even with all these ill-effects it is inevitable to use agricultural chemicals to grow the crops to feed the growing population and therefore they can be called as necessary evil. Although there are lot of studies about the use of these chemicals and their adverse effects, little has been revealed about the understanding of farmers about the impact of these agricultural chemicals and their

attitude towards mitigating the adverse effects of agricultural chemicals. Therefore, a research study focused on understanding the attitude of vegetable growers on the effects of agricultural chemicals and find out the association between characteristics of vegetable growers with their knowledge on the effects of agricultural chemicals.

METHODOLOGY

The investigation was conducted during the year 2018-19 and an Ex-post facto research design was followed to ascertain the attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals. Kolar district was selected purposively owing to more area and production of vegetables in the State. Kolar district has five taluks, out of which Kolar and Malur taluks were purposively chosen for the study considering the larger area under vegetable crops in the district. Statistical tools like frequency, simple percentage, mean, standard deviation and chi-square test was used and the data was collected from the vegetable growers using the pretested interview schedule.

RESULTS AND DISCUSSION

The results presented in Table 1 revealed that, more than half of the respondents (52.50%) had highly favourable attitude towards mitigating the ill-effects of agricultural chemicals followed by less favourable (29.17%) and favourable attitude (18.33%) levels. This may be due to experience of the ill-effects of agricultural chemicals like skin and eye irritation by the farmers themselves during application of agricultural chemicals and the other reason may be is the concern of farmers towards protecting their soil, soil microorganisms, groundwater and surface water and the environment as a whole. On the other side 18.33 per cent of the respondents had favourable attitude towards mitigating

the ill-effects of agricultural chemicals. One of the main reasons may be is that they do not have sufficient knowledge regarding the ill-effects of agricultural chemicals. It is interesting to note that still more than one fourth of them (29.17%) had less favourable attitude towards mitigating the ill-effects of agricultural chemicals. One of the major reasons may be that the use of agricultural chemicals has become inevitable option for controlling pests and obtaining economic benefits. Other reason may be due to no direct visualization of the ill-effects or their inability to recognize the adverse consequences of agricultural chemicals on soil, water, humans and environment as a whole due to no exposure to scientific background, training on mitigation measures and practices, non-availability of personal protective equipment's in the locality etc.

Statement wise attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals

Statement wise attitude of respondents in Table 1 revealed that nearly half of the respondents. (47.00%) strongly agreed that one should mandatorily wash the fruits and vegetables thoroughly before consumption to remove the chemical residues which would affect the health. More than two-third of the respondents (69.16%) agreed that every farmer should ensure that the pesticide container is always tightly closed to avoid leakage or spillage during transportation and storage. It was found that sixty per cent of the respondents were undecided whether to apply agricultural chemicals in the opposite direction or along the direction of wind. Slightly more than half of the respondents (51.66%) disagreed that one should always use protective gloves to mix/stir the agricultural chemicals. More than one third of the vegetable growers (35.83%) strongly disagreed that one should choose only a calm day for better application of agricultural chemicals to avoid any drift.

Table 1: Overall attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals (n=120)

Category	Criteria	Frequency	Percentage
Less favourable	Less than (Mean-0.5 SD)	35	29.17
Favourable	In between (mean $\pm$ 0.5 SD)	22	18.33
Highly favourable	More than (mean + 0.5 SD)	63	52.50

Mean=50.72, SD=2.04

Table 2: Statement wise vegetable growers' attitude towards mitigating the ill-effects of agricultural chemicals

S. No.	Statements	Level of agreement (%)					Score	Rank
		SA	A	UD	D	SD		
1	Farmers' should always use only scientists' recommended chemicals for controlling pests	19.16	47.50	0.00	22.50	10.83	368	4
2	Should apply only scientifically recommended dosage of agricultural chemicals to prevent any ill-effects	22.50	52.50	0.00	25.00	0.00	370	2
3	Farmer should ensure that the pesticide container is always tightly closed to avoid leakage or spillage during transportation and storage	30.83	69.16	0.00	0.00	0.00	367	5
4	Should ensure that the equipment used for spraying agricultural chemicals is perfect in working order and calibrate every time before using them	18.33	35.83	13.33	7.5	25.00	366	6
5	One must cover the economic and edible parts of the plant before applying agricultural chemicals	5.83	26.66	5.83	27.50	34.16	146	19
6	One should never use his mouth to siphon the chemical from the container	35.00	54.16	10.83	0.00	0.00	372	01
7	One should always handle the agricultural chemicals container safely without any physical damage	27.50	60.00	12.50	0.00	0.00	369	03
8	One should always use protective gloves to mix/stir the agricultural chemicals	2.50	6.60	3.3	51.66	36.66	139	20
9	One should choose only a calm day for better application of agricultural chemicals to avoid any drift	1.66	5.83	9.16	47.50	35.83	135	22
10	One should always apply agricultural chemicals in the opposite direction of wind	2.50	10	60.00	19.16	8.33	327	12
11	One should apply agricultural chemicals during dawn and dusk as honeybees are inactive at that time	5.00	22.50	44.16	24.16	4.16	365	8
12	One should not smoke or eat anything during application of agricultural chemicals	27.50	47.50	8.33	10.83	5.83	366	6
13	One must take bath with soap and clean water after the application of agricultural chemicals	25.00	52.50	5.83	9.16	7.5	365	8
14	One should compulsorily follow the waiting period for harvesting to avoid residues of agricultural chemicals in produce	2.50	13.33	39.16	30.83	14.16	156	17
15	One should dump the empty pesticide bottle into water body as a best disposal method	15.83	22.50	40.00	14.16	7.50	331	11
16	One should ensure decontamination of agricultural chemical container before burying it in the wasteland	5.83	15.83	47.50	19.16	11.66	246	14
17	One should always puncture empty agricultural chemicals container and never use for domestic purpose	3.33	12.50	50.00	25.00	9.16	166	16
18	One should burn the empty agricultural chemicals container as a safe disposal practice	19.16	30.83	9.16	26.66	14.16	173	15
19	One should not use simple eye drops to address the eyes affected during spraying of agricultural chemicals but consult the doctor immediately	14.16	22.50	24.16	30.00	9.16	148	18
20	Vomiting should be induced immediately by administering two table spoon of salt in a glass of water to a person who has consumed agricultural chemicals as a right first aid	11.66	17.50	20.83	35.83	14.16	137	21
21	One should ensure to read out the instructions on the label before using agricultural chemicals	17.50	37.50	18.33	17.50	9.16	320	13
22	One should mandatorily wash the fruits and vegetables thoroughly before consumption to remove the chemical residues which would affect the health	39.16	52.50	0.00	5.83	2.5	355	10

Ranking of attitude statements based on score

The results presented in the Table 2 further indicate that the statements saying, 'one should never use his mouth to siphon the chemical from the container', and 'one should apply only scientifically recommended dosage of agricultural chemicals to prevent any ill-effects' was given the 1st and 2nd rank with the total scores of 372 and 370 respectively. This indicated that generally like others, vegetable growers are also aware of Dos and Don'ts with respect to use of agricultural chemicals. Not using mouth to siphon of the chemical is merely a common sense but still some of the farmers open the container through their mouth without knowing of its consequences and majority of the respondents agreed that only scientifically recommended dosage of agricultural chemicals has to be sprayed. It may be because they may have personally experienced the consequences of excessive application of agricultural chemicals or they might have got the advice of extension professional in this regard. Whereas statements like 'one should always use protective gloves to mix/stir the agricultural chemicals' and 'one should choose only a calm day for better application of agricultural chemicals to avoid any drift' were given the lower ranks of 20 and 22 with the total scores of 139 and 135 respectively. This indicated that farmers are still not serious about the adverse effects of agricultural chemicals. They are not ready to undertake safety measures because the effects of agricultural chemicals are not immediately visible or mostly hidden or affect in the long run. As a result of this, vegetable growers are unable to recognize the hidden ill-effects of these chemicals and hence do not show favourable attitude towards mitigating these ill-effects.

It is apparent from Table 3 that, the variables such as education, risk orientation, extension participation, mass media exposure, and extension contact had positive and significant association with attitude at one per cent level. Whereas, farming experience, cosmopolitaness, scientific orientation, innovative proneness and achievement motivation were found to have positive and significant association with attitude at five per cent level. Other variable such as age, family size, annual income, size of land holding, showed positive but non-significant association with attitude. This might be due to fact that,

Table 3: Association between independent variables with the attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals

Characteristics	Chi-square value	Contingency value
Age	1.69 ^{NS}	1.305
Education	10.16 ^{**}	3.201
Family size	2.60 ^{NS}	1.619
Annual income	3.11 ^{NS}	1.771
Land holding	0.99 ^{NS}	0.999
Farming experience	5.78 [*]	2.414
Scientific orientation	11.67 [*]	3.430
Risk orientation	10.01 ^{**}	3.177
Innovativeness	12.61 [*]	3.566
Achievement motivation	9.99 [*]	3.174
Cosmopolitaness	12.66 [*]	3.573
Mass media participation	15.11 ^{**}	3.903
Extension agency Contact	13.67 ^{**}	3.713
Extension participation	14.11 ^{**}	3.772

^{**} = Significant at 1 per cent level; ^{*} = Significant at 5 per cent level; NS = Non-Significant

majority of the respondents (52.50%) showed more carefulness in handling, application and storage of agricultural chemicals. Their high level of extension contact (38.33%) would have helped them in acquiring ill-effects mitigation practices and their medium level of extension contact exposed them to the information regarding death of humans from pesticide consumption which made them to turn their attitude favourable in mitigating the ill-effects of agricultural chemicals. Age showed non-significant association with respect to attitude towards mitigating the ill-effects of agricultural chemicals, this may be due to the fact that almost one fifth of the respondents (19.17%) belonged to old age category who had no knowledge on the ill-effects of agricultural chemicals. The other reason may be is that they are feeble and no more interested in using on-farm resources effectively and efficiently, as a result of which they show less favourable attitude towards mitigating ill-effects of agricultural chemicals.

The above variables could be considered as good predictors of attitude of vegetable growers towards mitigating the ill-effects of agricultural chemicals.

Table 4: Extent of contribution of independent variables to the vegetable growers' knowledge on the effects of agricultural chemicals (N=120)

Characteristics	Regression co-efficient	Standard error of regression co-efficient	't' value
Age	0.41 ^{NS}	0.38	0.92
Education	0.11**	0.36	3.27
Family size	0.51 ^{NS}	0.39	0.76
Annual income	0.42 ^{NS}	0.20	0.47
Land holding	0.41 ^{NS}	0.36	0.87
Farming experience	0.56*	0.71	2.93
Scientific orientation	0.36*	0.86	2.38
Risk orientation	0.42*	0.89	2.11
Innovativeness	0.28*	0.81	2.89
Achievement motivation	0.55*	0.66	2.83
Cosmopolitaness	0.39*	0.86	2.20
Mass media exposure	0.11**	0.36	3.27
Extension agency contact	0.10**	0.38	3.80
Extension participation	0.13**	0.42	3.23

** = Significant at 1 per cent level; * = Significant at 5 per cent level; NS = Non-Significant

Whereas, co-efficient of determination (R^2) of the independent variables was 0.790. It means that 79.09 per cent of the total variation in the attitude level was explained by the 14 selected independent variables. It implied that there are other unidentified variables contributing to the variation not included in the present study (Table 4).

CONCLUSION

The results revealed that more than half of the respondents (52.50%) of the vegetable growers belonged to highly favourable attitude towards mitigating the ill-effects of agricultural chemicals whereas, 18.33 and 29.17 per cent of the respondents belonged to favourable and less favourable attitude levels respectively. Sixty per cent of the vegetable growers were undecided whether to spray agricultural chemicals in the opposite direction of wind or along the direction of wind, nearly half of the vegetable growers. (47.50%) agreed that farmers should always use only those chemicals that are recommended by scientists for controlling insects and pests, exactly (50.00%) of them were undecided that disposal of empty agricultural chemical container by puncturing and never using it for domestic purpose ensures safety, one fourth.

of the vegetable growers (25.00%) strongly disagreed that one should make sure that the equipment used for spraying agricultural chemicals is perfect in working order and calibrate every time before using them. The independent variables like education, risk orientation, extension participation, mass media exposure, and extension contact had positive and significant association with attitude at one per cent level. This is a research study of unique kind which tries to test the non-material aspects of vegetable growers. With the findings the government organizations such as Pollution Control Board and other environmental concerned departments may take lead to seriously implement integrated systems of pest control and nutrient application.

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A Study on Livelihood Options among the Tribal in Rayagada District of Odisha

M. Samarath, P. Swain*, K. Shweta and B.C. Das

ABSTRACT

The research study was conducted among randomly selected 120 tribal respondents of Rayagada, district of Odisha to know the priority given by tribal to their livelihood options basing on their practices and experiences. The study revealed that that agriculture as livelihood option was ranked first, followed by government/semi-government/private job, horticulture, animal husbandry, fishery, caste-based occupation, NTFP's collection, agricultural labour and non-agricultural labour, respectively. The mean scores with regard to strength of agriculture, animal husbandry, forestry, fishery and wage labour were estimated as 18.09 ± 0.16 , 19.70 ± 0.15 , 19.25 ± 0.17 , 17.97 ± 0.27 and 19.16 ± 0.16 , respectively, with significant difference among them. The mean scores with regard to weakness of agriculture, animal husbandry, forestry, fishery and wage labour were estimated to be 18.89 ± 0.13 , 19.25 ± 0.17 , 16.89 ± 0.13 , 17.88 ± 0.22 and 17.98 ± 0.17 , respectively, with significant difference among them. The mean scores with regard to opportunity on livelihood options viz. agriculture, animal husbandry, forestry, fishery and wage labour were estimated to as 15.60 ± 0.18 , 17.60 ± 0.18 , 16.60 ± 0.18 , 15.97 ± 0.27 , 14.60 ± 0.18 , respectively, with significant difference among them. The mean scores with regard to threat were estimated with significant difference among them. The degree of association between annual income and strength was estimated as 0.023. Corresponding values with weakness, opportunity and threat were found to be -0.025, -0.080 and -0.084.

Keywords: Livelihood options, Opportunity, Strength, Threats, Tribal, Weakness

INTRODUCTION

India has the largest tribal population (10.45 crore, constituting 8.6%) in the world, and tribal communities are the integral segment of Indian society. 89.97 per cent of them live in rural areas and 10.03 per cent in urban areas. India, with a variety of ecosystems, presents a varied tribal population throughout its length and breadth depicting a complex cultural mosaic. There are over 500 scheduled tribes in India notified under Article 342 of the Constitution of India, spread over different states and Union Territories of the country. The Scheduled Tribes are notified in 30 States/UTs and the number of individual ethnic groups, etc. notified as Scheduled Tribes is 705.

The tribal, since ages have been living in hilly and forest areas. Their livelihood is more dependent on the forest resources that too limited to their habitations. Moreover, they have very limited agricultural and allied activities confining to small water bodies, grassland and vegetation. Their activities are mainly confined to search of prey, hunting and shifting cultivation. They are illiterate, having orthodox nature, faith on dogmas and blind beliefs (Barman *et al.*, 2013). However, with the advancement of science and technologies and accessibility of tribal to the scientific knowhow through different programmes intervened by government, they have started domesticating livestock and doing agricultural and horticultural activities (Datta *et al.*, 2014) and their

empowerment programmes are in vogue. However, majority of tribal women are at medium to low level of empowerment, mere involvement of women in dairy activities does not imply their simultaneous involvement in making decisions in the concerned activities as doing and deciding are two different facets (Singh *et al.*, 2017). The Tribal, at present are engaged in different income generating activities throughout the day and sustain their day to day livelihood. This study was conducted to know the priority given by tribal to their livelihood options basing on their practices and experiences.

METHODOLOGY

Out of 30 districts in Odisha, Rayagada District was selected for this present study. From three Blocks of the District, 2 villages from each block and 20 respondents from each village, coming to 120 respondents were randomly selected for the study. The standard tools were used to prioritize of livelihood options and SWOT analysis. Zero order Pearson's correlation analysis, Garret ranking and ANOVA were applied to draw inferences.

RESULTS AND DISCUSSION

Nine livelihood options in the tribal communities such as agriculture, horticulture, animal husbandry, collection of NTFP's, fishery, Govt./semi-government/private job, agricultural labour, non-agricultural labour and caste-based occupation were identified. Opinions of government officials working in the tribal study areas have been taken and again triangulated with local tribal people for validating the said nine options. The tribal respondents were asked to rank the above nine livelihood options basing on suitability with respect to more profit, less time consuming, feasibility, compatible to their socio-economic,

Table 1: Prioritization of livelihood options by tribal respondents

S.No	Livelihood Options	Mean Score	Rank
1	Agriculture	72.36	I
2	Horticulture	64.83	III
3	Animal Husbandry	57.24	IV
4	NTFP's collection	36.36	VII
5	Fishery	53.80	IX
6	Agricultural labour	34.63	VIII
7	Non-agricultural labour	32.78	X
8	Govt/Semi govt/Private job	65.11	II
9	Caste-based occupation	45.11	VI

socio-cultural and socio-environmental factors, availability of technical guidance and support of financial institutions. The data were collected, analyzed statistically with help of Garret's ranking technique and result is shown in the Table 1. Data reveals that agriculture as livelihood option was ranked first, followed by government/semi-government/private job, horticulture, animal husbandry, fishery, caste- based occupation of the respondents, NTFP's collection, agricultural labour and non-agricultural labour, respectively.

Average values of SWOT scores on different livelihood options are presented in Table 2. Overall mean scores of strength, weakness, opportunity and threats on all livelihood options were calculated as 18.96 ± 0.08 , 18.22 ± 0.82 , 16.09 ± 0.10 and 16.18 ± 0.20 , respectively. The mean scores with regard to strength of agriculture, animal husbandry, forestry, fishery and wage labour were estimated as 18.09 ± 0.16 , 19.70 ± 0.15 , 19.25 ± 0.17 , 17.97 ± 0.27 and 19.16 ± 0.16 , respectively, with significant difference among them. The strength of animal

Table 2: Mean $\pm$ SE of SWOT scores for different livelihood options

Livelihood options	N	Strengths	Weaknesses	Opportunities	Threats
Agriculture	120	$18.09^a \pm 0.16$	$18.89^c \pm 0.13$	$15.60^b \pm 0.18$	$16.95^b \pm 0.47$
Animal Husbandry	120	$19.70^b \pm 0.15$	$19.25^c \pm 0.17$	$17.60^d \pm 0.18$	$14.60^a \pm 0.18$
Forestry	120	$19.25^b \pm 0.17$	$16.89^a \pm 0.13$	$16.60^c \pm 0.18$	$14.95^a \pm 0.47$
Fishery	42	$17.97^a \pm 0.27$	$17.88^b \pm 0.22$	$15.97^b \pm 0.27$	$16.88^b \pm 0.22$
Wage labour	120	$19.16^b \pm 0.16$	$17.98^b \pm 0.17$	$14.60^a \pm 0.18$	$17.95^b \pm 0.47$
Total	522	18.96 ± 0.08	18.22 ± 0.82	16.09 ± 0.10	16.18 ± 0.20

*Means with different superscripts along the column (for a factor) indicate significantly ($P < 0.05$)

Table 3: ANOVA of SWOT scores of different livelihood options

Factors	Sum of Squares	df	Mean Square	F
Strength				
Between Groups	213.520	4	53.380	15.889**
Within Groups	1736.926	517	3.360	
Total	1950.446	521		
Weakness				
Between Groups	406.779	4	101.695	36.096**
Within Groups	1456.546	517	2.817	
Total	1863.326	521		
Opportunity				
Between Groups	600.592	4	150.148	600.592**
Within Groups	2148.176	517	4.155	
Total	2748.768	521		
Threat				
Between Groups	951.493	4	237.873	11.892**
Within Groups	10341.580	517	20.003	
Total	11293.073	521		

**p<0.01

husbandry, forestry and wage labour livelihood options were found to be higher than other two livelihood options. However, there was no significant difference between the former three livelihood options. The strength of

agriculture and fishery were found similar but numerically the strength of agriculture was higher than that of fishery, which was found to have the lowest strength in the present study (Table 3).

The mean scores with regard to weakness of agriculture, animal husbandry, forestry, fishery and wage labour were estimated to be 18.89 ± 0.13 , 19.25 ± 0.17 , 16.89 ± 0.13 , 17.88 ± 0.22 and 17.98 ± 0.17 , respectively, with significant difference among them (Table 4). The weakness on animal husbandry and agriculture livelihood options were found to be higher than other three livelihood options. However, there was no significant difference between the former two options. The weakness of wage labour and fishery were found to be similar but stronger than that of forestry, which was found to have the lowest weakness in the present study.

The mean scores with regard to opportunity on livelihood options viz. agriculture, animal husbandry, forestry, fishery and wage labour were estimated to as 15.60 ± 0.18 , 17.60 ± 0.18 , 16.60 ± 0.18 , 15.97 ± 0.27 , 14.60 ± 0.18 , respectively, with significant difference among them (Table 4). The opportunity on animal husbandry livelihood option was found to be the highest, followed by forestry. There was significant difference between the former two options. The opportunity of fishery and

Table 4: Zero order Pearson's correlation coefficient among SWOT scores of livelihood options and annual income

Variables	Strength	Weakness	Opportunity	Threats	Income
Strength	Correlation	0.671	0.677	0.529	0.023
	Significance level	.000	.000	.000	.801
	df	118	118	118	118
Weakness	Correlation	0.671	0.644	0.450	-0.025
	Significance level	.000	.000	.000	.788
	df	118	118	118	118
Opportunity	Correlation	0.677	0.644	0.603	-0.080
	Significance level	.000	.000	.000	.387
	df	118	118	118	118
Threats	Correlation	0.529	0.450	0.603	-0.084
	Significance level	.000	.000	.000	.362
	df	118	118	118	118
Income	Correlation	0.023	-0.025	-0.080	-0.084
	Significance level	.801	.788	.387	.362
	df	118	118	118	118

agriculture were found similar but stronger than that of wage labour, which was found to have the lowest opportunity in the present study.

The mean scores with regard to threat of agriculture, animal husbandry, forestry, fishery and wage labour were estimated to as 16.95 ± 0.47 , 14.60 ± 0.18 , 14.95 ± 0.47 , 16.88 ± 0.22 and 17.95 ± 0.47 , respectively, with significant difference among them (Table 4). The threat on wage labour livelihood option was found to be the highest among all livelihood options, followed by agriculture and fishery. However, there was no significant difference among the former three options. The threat of forestry and animal husbandry were found to be similar but animal husbandry as a livelihood option has the lowest weakness in the present study.

Pearson's correlation coefficients among total SWOT scores of livelihood options and annual income of respondents are presented in Table 4. The degree of association between annual income and strength was estimated as 0.023. Corresponding values with weakness, opportunity and threat were found to be -0.025, -0.080 and -0.084. None of the above correlations were found to be significant. So it is revealed that very weak association existed between annual income and SWOT of livelihood options viz. agriculture, animal husbandry, forestry, fishery and wage labour. Further, very strong and significant degree of association among four components of SWOT was revealed. The correlation coefficient between strength and weakness was estimated 0.671, which was found to be significant. Corresponding values between strength versus opportunity and strength versus threat were 0.677 and 0.529, respectively which were also significant. Similarly, weakness showed strong and significant relationship with opportunity and threats having estimates of 0.644 and

0.450, respectively. Further, opportunity was found to have strong, positive and significant degree of association with correlation coefficient of 0.603 in the present study.

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Impact Assessment of Skill Development Training on Low Cost Mushroom Production Technology in Panipat District of Haryana

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ABSTRACT

The present study was undertaken to assess the impact of skill development training about Low Cost Mushroom Production Technology as an enterprise on knowledge gain. A total number of 90 trainees who have undergone through five days skill development training at Krishi Vigyan Kendra, Panipat were selected as a sample for the study. The impact of training programme was assessed by pre and post evaluation testing in terms of improvement in knowledge on various aspects of Low Cost Mushroom Production Technology. It was observed that pre-training knowledge score was not much satisfactory for all the aspects of training programme. However, the knowledge score gained by respondents after training was more satisfactory in all aspects. The study revealed that experience to training had increased the knowledge of SC/ST Farm Women and Rural Youth regarding Low Cost Mushroom Production Technology. In pre-evaluation test, the knowledge range of different participants was 4.4 per cent regarding Insect-Pest & Disease of mushroom and its management to 46.6 per cent in case of knowledge nutritional importance of mushrooms. Post training score of various practices ranged from 86.6 per cent in case of chemical used for sterilization of casing mixture to 100 per cent in case of various practices like nutritional status of mushroom, method of spawning, method of casing, moisture Content in prepared Compost, Seed rate i.e. spawn required for 100 kg prepared compost, harvesting Method, Number of days for harvesting, value addition of Mushroom, marketing channel, storage of Mushroom, Number of days required for pin head initiation etc.

Keywords: Gain in knowledge, Mushroom production

INTRODUCTION

Skill development Training and demonstration are integral part of KVK Extension System. At present there are over 700 KVK-about one KVK in each district of India. KVK have twin role-one is training of farmers in new technologies and practices and another is demonstration. KVK playing an important role in encouraging Schedule Caste landless rural women to take up simple and quick Income Generating Activity (IGA) from where they can earn additional income. KVK

Panipat took up an initiative for popularization of Mushroom Cultivation among SC landless rural women. Mushroom cultivation is a good enterprise for SC landless rural women as it is grown on agricultural waste, require less land, and require short span of time to grow.

White Button Mushroom (*Agaricus bisporus*) is very popular in Panipat district of Haryana and alone contributes about 95 per cent of the total mushroom production in the state, a large quantity (80%) is consumed as fresh and remaining is canned. It is grown

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on agriculture wastes like wheat straw, paddy straw etc. and these waste are available in huge amount in Panipat district of Haryana. Mushroom cultivation showed a new approach of socio-economic development for the farm women and rural youth due to its low cost investment and high yields obtained even under rural condition. Haryana has also a location specific advantage being nearer to national capital and therefore, potential market is available for marketing of agro-products. Keeping in view the availability of abundant quantity of agricultural waste, there is ample scope of increasing mushroom production in Haryana state. Mushroom production will improve the socio-economic condition of SC/ST farmers and farm women and resolve employment problems of both literate and illiterate. Hence, this study was undertaken with an objective to assess the impact of Skill Development training programme on knowledge gain about Low Cost Mushroom Production Technology as an enterprise. Skill training is defined as an action oriented way of training in which the activity is performed. To find out the impact of any skill development training programme a evaluation of what is being done is essential, on the basis of what necessary changes can be made to make the training programme more effective (Lal and Tandon, 2011).

METHODOLOGY

Krishi Vigyan Kendra, Panipat organized three Skill development training programmes on low Cost Mushroom Production Technology under the project "Improvement in the Livelihood of SC/ST Farmers/Farm Women. These training programmes focused on only SC/ST Farmers, Farm Women, and Rural Youth, those who have interested in self-employment. Total number of 90 Schedule Caste women participated in these five days programmes conducted during the year 2018-19.

For evaluating the impact of Skill development training programme on low cost Mushroom Production Technology, appropriate schedule was prepared comprising of general information, background of trainees such as age, education, occupation etc. A pre-evaluation test was performed to know the level of knowledge of trainees regarding types of mushroom, optimum growing time, nutritive value, method of compost preparation,

preparation of casing, spawn and spawning, diseases of mushrooms, harvesting techniques, grading, packing and marketing of mushroom, nutritive value as well as value addition etc. Similarly, in order to assess the knowledge gained by the trainees, post-evaluation was also performed just after completion of training programme. Hence, gain in knowledge was calculated from the difference of scores obtained in pre and post knowledge test of the trainees. Likewise, the suggestions from the trainees were also discussed for bringing further improvement in the skill development training programme. The data were analyzed using frequency, percentages and ranking. Hence, gain in knowledge was calculated from the difference of scores obtained in pre and post knowledge test of the trainees.

RESULTS AND DISCUSSION

All the trainees varied in age, education, occupation and landholding. The data in Table 1 showed that majority of the participants were in the middle age group i.e. 31-50 years followed by young i.e. less than 30 years of age. It was also inferred that 86.7 per cent farmers were landless farm labourers whereas 13.3 were marginal farm

Table 1: Socio-economic status of mushroom trainees

Characteristics	Mushroom cultivation trainees	
	Frequency	Percentage
Age		
Young (less than 30 years)	26	28.9
Medium (31 to 50 years)	54	60.0
Old (more than 50 years)	10	11.1
Education		
Illiterate	5	5.6
Primary school	45	50.0
Middle school	35	38.9
High school	5	5.5
Land Holding		
Landless	78	86.7
Marginal (less than 1 ha)	12	13.3
Big (More than 1 ha)	0	
Occupation		
Farming	13	14.4
Vegetable selling	7	7.8
House wife	70	77.8

women having less than 1 hectare while none of the trainees having more than 1 ha farming land. The data also highlighted that 50.0 per cent studied up to primary level followed by middle level i.e. 38.9 per cent and equal percentage of trainees i.e. 5.5 per cent were illiterate as well as attaining high school.

Considering all the above said evaluating parameters it was apparent that mushroom cultivation enterprise does not require much land and therefore, landless farmers were found to be interested to adopt this enterprise to add-on their family income. It was observed that 77.8 per cent of trainees belonged to housewife followed by 14.4 per cent belonged to farming. These findings were in line with the results of the Rachna *et al.* (2013).

The factors which motivated the respondents to join the training course were given for ranking in order of importance as perceived by them. Table 2 shown that 68.9 per cent trainees joined training programme to adopt mushroom production as an enterprise, 58.8 per cent wanted to learn about production technology of mushroom for nutritional security and additional source of income. Almost cent per cent trainees wanted to know how to grow different variety of mushroom, 40.0 per cent joined the training course just to get the certificate of training to get loan from bank to start their enterprises and 62.22 per cent wanted to establish linkage with KVK for further up gradation of knowledge. Lesser participants showed their interest to transfer the skill to fellow farmers about mushroom production. Similar results were also reported by Kaur, 2016. It was evident that majority of respondents joined the training course to learn about production technology of different variety of mushroom followed by household nutrition and additional source of income.

The overall knowledge level of respondents was found to be changed after the training. Change in knowledge regarding mushroom cultivation was recorded for sub-components. It was observed that nutritional importance of mushroom, types of mushroom, raw material, mushroom Spawn, importance of Casing, required temperature and humidity for fruiting, harvesting methodology, preservation techniques, marketing channels, awareness and availability of loans and subsidies from the government and mushroom recipes. It may therefore, be concluded that trainees succeeded in acquiring knowledge after exposure to training on mushroom production. Thus, it can be inferred that exposure to training had increased the knowledge of respondents regarding all the sub-components of mushroom production. The data in Table-3 revealed that more than 80 per cent of trainees were deviating in knowledge on method of compost preparation, raw Material required for compost preparation, moisture content in prepared compost, method of casing, seed rate i.e. Spawn required for 100 kg prepared compost, method of spawning, Number of days required for pin head initiation, Number of days for harvesting and Method of Harvesting, Chemical used for washing mushroom and Awareness and availability of loans and subsidies from the government.

Only 60.0 per cent of trainees were deviating knowledge on Optimum time of White Button Mushroom Sowing after training while 53.4 per cent of the trainees were deviating in knowledge on Nutritional importance of Mushroom after training. It was thus concluded that pre training knowledge score was not much satisfactory for all the aspects of training programme. However, the knowledge score gained by participants after training was

Table 2: Reasons of participation in training programme in mushroom cultivation (N=90)

Reasons	Frequency	Percentage
To adopt mushroom production as an enterprise	62	68.88
To learn about production technology of mushroom for nutrition and additional source of income	53	58.88
How to grow different variety of mushroom	81	90.00
To get certificate of training course for loan from bank	36	40.00
To establish linkage with KVK	56	62.22
Transfer the skill to fellow farmers about mushroom production	21	23.33

Table 3: Gain in knowledge after acquiring training with respect to different operation

Particulars	Pre-Evaluation	Post - Evaluation	Gain in Knowledge
Different types of mushroom grown in Haryana	15 (16.6)	87 (96.6)	+72 (80.0)
Optimum time of White Button Mushroom Sowing	29 (32.2)	83 (92.2)	+54 (60.0)
Nutritional importance of Mushroom	42 (46.6)	90 (100)	+48 (53.4)
Method of Compost Preparation	6 (6.6)	86 (95.5)	+80 (88.9)
Raw Material required for compost preparation	12 (13.3)	90 (100)	+78 (86.7)
Number of days required for Compost preparation in long Method	11 (12.2)	87 (96.6)	+76 (84.4)
Moisture Content in Prepared Compost	9 (10)	90 (100)	+81 (90.0)
Casing Mixture preparation	8 (8.8)	84 (93.3)	+75.2 (84.5)
Method of Casing	10 (11.1)	90 (100)	+ 80 (88.9)
Chemical used for sterilization of casing mixture	8 (8.8)	78 (86.6)	+70 (77.8)
Availability of Spawn	11 (12.2)	90 (100)	+79 (87.8)
Seed rate i.e. Spawn required for 100 kg prepared compost	7 (7.7)	90 (100)	+83 (92.3)
Method of spawning	8 (8.8)	90 (100)	+82 (91.2)
Number of days required for mycelia growth	12 (13.3)	86 (95.5)	+74 (82.2)
Optimum temp. and humidity for fruiting	7 (7.7)	84 (93.3)	+77 (85.6)
No of days required for pin head initiation	6 (6.6)	90 (100)	+84 (93.4)
Method of harvesting and Number of days for harvesting	8 (8.8)	90 (100)	+82 (91.2)
Chemical used for washing mushroom	0	81 (90)	+81 (90.0)
Storage Marketing Channel of Mushroom	11 (12.2)	90 (100)	+79 (87.8)
Insect-Pest and Disease of Mushroom and its Management	4 (4.4)	80 (88.8)	+76 (84.4)
Value addition of Mushroom	28 (31.1)	90 (100)	+62 (68.9)
Awareness and availability of loans and subsidies from the government	7 (7.7)	87 (96.7)	+80 (88.9)

Table 4: Suggestion given by the trainees for improvement in training course

Suggestion	Frequency	Percentage
More importance to method demonstration	68	75.5
Regular supply of good quality spawn	75	83.3
Supply Literature / booklets / guide book on Mushroom	70	77.8
Publicity of mushroom nutritional benefits in rural /urban areas for increasing consumption of Mushroom	45	50.0
Linkages with banks and other government offices engaged in rural development for specially for financial assistance	72	80.0
To increased duration of training Programme	12	13.3
Organize training at different out stations for better exposure	10	11.1

more satisfactory in all aspects. The reason behind the satisfactory gain in knowledge might be the keen interest of all the participants about this entrepreneur. The findings were similar to the results reported by Nagaraj *et al.* (2017) and Kaur (2016) that exposure to training increased the knowledge of farmers, farm women and youths. Thus,

it can be revealed that exposure to training had increased the knowledge regarding all the sub-components of Low Cost Mushroom Production Technology. The reason behind the satisfactory gain in knowledge might be keen interest in of mushroom trainees as well good educational background of participant. Financial assistance provided

by the KVK may be another aspect for gain in knowledge more than 80 per cent in almost all the aspect of mushroom cultivation.

The suggestions offered by the mushroom trainees for further improvement of the training course were confirmed that more importance must be given to the regular supply of good quality spawn, Linkages with banks and other government offices engaged in rural development for specially for financial assistance, supply of mushroom literature, more importance on method demonstration. Only 13.3 per cent trainees also suggested on increase in duration of training, while 11.1 per cent were in favour of organizing training at different out stations for better exposure.

CONCLUSION

It can be concluded from the study that training is a very good tool for skill development of trainees and good conduct of training provide trainees needed information and guidance to start and do well any enterprise. Mushroom cultivation is such an enterprise in which requirement of land is not a big issue so even landless farmers can augment their income through mushroom

cultivation. The trainees were inspired greatly by the easy method of low cost mushroom production technology. Krishi Vigyan Kendra playing an important role in encouraging farmers and farm women and rural youths to take up simple and quick income generating enterprises from where they can earn additional income.

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A Study of Technological Gaps in Pineapple Cultivation in Darjeeling District of West Bengal

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ABSTRACT

The study on pineapple production technology adoption was conducted in Phansidewa Block of Darjeeling district of West Bengal state. The technological gap for marginal farmers' ranged from 97.11 to 32.00 per cent whereas, the marginal farmers had very little knowledge about the post-harvest technology, thus resulted poor quality. Technological gap of small farmers' ranged from 27.77 to 94.00 per cent. The technological gap for medium farmers ranged from 14.00 to 86.11 per cent. Farmers in general were not fully aware of all the recommended scientific practices. It was also evident that the farmers in general were having maximum technological gap in fertilizer application. It has been advocated that a blank recommendation for all categories of farmers will not serve the purpose hence location and farmer specific recommendations need to be devised.

Keywords: Category of farmers, Pineapple, Technology gap

INTRODUCTION

India enjoys its spatial advantage for exporting pineapple to Gulf countries as well as to European countries. India poses 1st rank in terms of harvested area (1,11,000 ha) of pineapple among the Asian and BRICS countries (FAO, (ON1407) 2017). In India, West Bengal ranked first in pineapple production (345.15, 000' MT) in 2017-18 (Ministry of Agriculture and Farmers Welfare, Govt. of India (ON1601) and (ON1955). Where, North Bengal provides the major bulks for this. Agri-Export Zone for promoting exports of pineapple has already been established in North Bengal. Despite of its huge potential the production is not to the ear mark. West Bengal is too far from true utilization of its potential. Farmers of this region have adopted different technologies of pineapple production. But most of the farmers of the area, have not adopted the total recommended package of practices regarding scientific cultivation. There is a big gap between

the recommendation made by the scientists and field level adoption by the farmers. The study conducted to find out the extent of technological gaps among different categories of farmers and strategy to lessen the gap.

METHODOLOGY

Phansidewa Block of Darjeeling district, where the maximum numbers of farmers are engaged in pineapple cultivation, selected purposively for this research work. Out of 7 Gram Panchayats in this block, 3 Gram Panchayats, namely Bidhannagar-I, Bidhannagar-II and Chathat-Bansgaon were selected purposively as per the recommendations of the extension personnel working in the district and in block, where pineapple is cultivating intensively for last few years. The farmers were stratified into five categories on the basis of their size of land holdings viz. marginal (below one hectare), small (one to two hectare), semi-medium (two to four hectare), medium

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(four to ten hectare) and large (ten hectare and above). These criteria adopted from Highlights of Agriculture Census 2010-11, Ministry of Agriculture and Farmers Welfare, Government of India. As the total number of semi-medium, medium and large farmers in the study area were very few; they were grouped together and categorized as medium farmers. A total number of 200 respondents were selected randomly and were grouped into three categories i.e. marginal farmers (127), small farmers (57) and medium farmers (16). The respondents were interviewed through personal interview method with the help of structured schedule.

For quantifying the technological gap, one score was assigned to each right answer and zero score for each wrong answer or no answer in respect of each item of every questions of the technological gap. The mean score obtained and technological gaps were worked out for different categories of the farmers. Based on the gap percentage corresponding ranks were assigned.

The technological gap was calculated using the following formula:

$$\text{Technological gap} = \frac{\text{Extent of recommendation} - \text{extent of adoption}}{\text{Extent of recommendation}} \times 100$$

RESULTS AND DISCUSSION

The pineapple growers of Darjeeling district have adopted so many technologies and they are proficient enough to achieve good quality production. In spite of

numerous efforts of different scientists and extension personnel, it has been observed that the production, productivity and the quality have not been reached to the expectation level of both the researcher and the growers. There is a gap between expectation and the result, and between the recommendation and practices i.e. technological gap. So it is necessary to find out the bottlenecks and extent of technological gap among different categories of farmers and strategy to lessen the gap. Here, an attempt has been made to analyse the degree of adoption of recommended package of practices for various components of pineapple cultivation practices like selection of variety, selection, preparation and treatment of planting materials, planting method, improved intercultural operations, fertilizer application, pest, disease and other physiological disorder control, irrigation, regulation of flowering and ripening, harvesting and post-harvest practices in order to work out the technological gap.

Table 1 shows that technological gap for marginal farmers' ranges from 97.11 to 32.00 per cent. It also reveals that none of the recommendations were fully adopted by the farmers. The highest technological gap was found in fertilizer application (97.11%). This gap turns into a strong need to minimize or put an end to the gaps. The gap may be due to lack of awareness of the marginal farmers about fertilizer requirements of the pineapple, balanced fertilizer dose, farmers' apathy and lack of interest regarding scientific knowledge's etc. The second major technological gap (78.50%) was found in post-

Table 1: Extent of technological gap of marginal farmers in pineapple cultivation

Practices of pineapple cultivation	Maximum attainable score	Mean score obtained	Gap in percentage	Ranks
Selection of variety	3	1.00	66.66	IV
Selection, preparation and treatment of planting materials	9	5.35	40.55	IX
Planting method	15	5.17	65.53	V
Improved intercultural operations	6	2.24	62.66	VI
Fertilizer application	9	0.26	97.11	I
Pest, disease and other physiological disorder control	11	4.46	59.45	VII
Irrigation	1	0.68	32.00	X
Regulation of flowering and ripening	4	2.36	41.00	VIII
Harvesting	5	1.65	67.00	III
Post-harvest practices	4	0.86	78.50	II

harvest practices. A large percentage of the production goes to different parts of India and to neighbouring country also. But, the marginal farmers had very little knowledge about the post-harvest technology, thus resulted poor quality.

The lowest technological gap (32.00%) was found in irrigation. They aware about the water requirement but at the same time they also mentioned that, nowadays they forced to bear extra cost due to groundwater depletion.

Table 2 reveals that technological gap of small farmers' ranges from 27.77 to 94.00 per cent. Same as the marginal farmers, small farmers also had highest technological gap in fertilizer application. They commonly believed in the more the merrier condition and thus applying the fertilizer extensively. Very few of them hardly attended any extension programmes like training, krishimela, farmers meeting, campaign, exhibition etc. They were not fully aware about the nutrient deficiency of pineapple, fertilizer requirements of their soils, methods and time of fertilizer application etc. They candidly admitted that for any fertilizer related queries they used to consult with the local fertilizer dealer. This inadequate knowledge of fertilizer management might be an important reason for low level adoption of recommended doses by the small farmers and ultimately resulted in higher technological gap. The second major technological gap (69.25%) was found in post-harvest practices. The reason behind this was same as for marginal farmers i.e. lack of

knowledge. The third technological gap (66.66%) was found in selection of variety. In case of variety selection, majority of the farmers practiced only one variety i.e. Kew variety. But, they have shown their interest in other tested variety with financial support either from Government or from other organization.

The lowest technological gap (27.77%) was found in selection, preparation and treatment of planting materials. Though they know very well how to select the sucker and prepare the sucker for planting, but very few of them treat the planting materials before planting. This might be due to lack of knowledge and interests from farmers' sight and less number of extension programme attended by them in the region.

Table 3 conveys that the recommended technologies were also not fully adopted by the medium framers like marginal and small farmers. The technological gap for medium farmers ranged from 14.00 to 86.11 per cent. The highest gap (86.11%) was found in the practice of fertilizer application. The reasons behind these were found same as mentioned earlier like inadequate knowledge about fertilizer requirements of pineapple and the soil, much more dependency on local fertilizer dealers etc. They all agreed that soil testing is important before applying the fertilizer. But they were not familiar with the whole process. They have expressed their urgent need for training on soil testing by using soil testing kit. So, that they can do it by themselves. They also reported that, it will be better for them if any Government or other agency

Table 2: Extent of technological gap of small farmers in pineapple cultivation

Practices of pineapple cultivation	Maximum attainable score	Mean score obtained	Gap in percentage	Ranks
Selection of variety	3	1.00	66.66	III
Selection, preparation and treatment of planting materials	9	6.50	27.77	X
Planting method	15	6.60	56.00	VI
Improved intercultural operations	6	2.63	56.16	V
Fertilizer application	9	0.54	94.00	I
Pest, disease and other physiological disorder control	11	6.12	44.36	VII
Irrigation	1	0.65	35.00	VIII
Regulation of flowering and ripening	4	2.88	28.00	IX
Harvesting	5	1.68	66.40	IV
Post-harvest practices	4	1.23	69.25	II

Table 3: Extent of technological gap of medium farmers in pineapple cultivation

Practices of pineapple cultivation	Maximum attainable score	Mean score obtained	Gap in percentage	Ranks
Selection of variety	3	1.38	54.00	IV
Selection, preparation and treatment of planting materials	9	5.81	35.44	VI
Planting method	15	11.19	25.40	IX
Improved intercultural operations	6	3.69	38.50	V
Fertilizer application	9	1.25	86.11	I
Pest, disease and other physiological disorder control	11	7.63	30.63	VIII
Irrigation	1	0.69	31.00	VII
Regulation of flowering and ripening	4	3.44	14.00	X
Harvesting	5	2.06	58.80	III
Post-harvest practices	4	1.25	68.75	II

support them financially by providing soil testing kits individually or in group. The second highest technological gap (68.75%) was found in post-harvest technology of pineapple cultivation.

Few medium farmers did experiments on other varieties like Queen, Mauritius, MD-2, MTS, T3, Amrutha and Nanas on a limited scale. Unfortunately they faced a huge loss in their experiment (Mandal, 2015). But their attitude towards innovative practices resulted with a new history in the region. Now, they are looking for financial support from Government sector to continuing their practices.

The lowest technological gap (14.00%) was found in regulation of flowering and early ripening of the fruit. They do it by using growth regulators. They applied it to

schedule the flowering of the plant and harvest to synchronise with the season of highest demand and price.

Table 4 shows the technological gap for pooled farmers. It clearly indicates that farmers in general in that region were not fully aware of all the recommended scientific practices. It also reveals that the farmers in general were having maximum technological gap in fertilizer application. The result supports the findings of Roy *et al.* (2013); Nain and Chandel (2013); Sharma *et al.* (2018) and Singh *et al.* (2018). Whereas, Basanayak *et al.* (2014), in his study observed highest mean technological gap was in disease management followed by fertilizer application, pest- management, pit size, spacing, FYM, irrigation method and plating season. Here, second highest technological gap was found in post-harvest practices. The reasons behind these two were

Table 4: Extent of technological gap of pooled farmers in pineapple cultivation

Practices of pineapple cultivation	Maximum attainable score	Mean score obtained	Gap in percentage	Ranks
Selection of variety	3	1.03	65.66	III
Selection, preparation and treatment of planting materials	9	5.82	35.33	IX
Planting method	15	6.06	59.60	V
Improved intercultural operations	6	2.47	58.83	VI
Fertilizer application	9	0.42	95.33	I
Pest, disease and other physiological disorder control	11	5.19	52.82	VII
Irrigation	1	0.67	33.00	X
Regulation of flowering and ripening	4	2.60	35.00	VIII
Harvesting	5	1.70	66.00	IV
Post-harvest practices	4	1.00	75.00	II

farmers' inadequate knowledge regarding scientific practices, lack of knowledge about nutrient management, right dose of fertilizer and time of fertilizer application. It was also noticed that some farmers used to apply comparatively cheap and easily available nitrogenous fertilizer in huge amount than other fertilizers and nutrient. That hampers the quality.

The technological gap in post-harvest practices reveals similar trend in marginal, small and medium farmers with 2nd rank. They also mentioned that one cold storage for pineapple is already built up in that region but till date it is not functioning. They believed it will help them in future to get maximum profit from their production.

CONCLUSION

Hence, to reduce the gap, improved and low cost technologies must be introduced through intensive extension system with proper training programmes for all categories of farmers from time to time. The problem faced by the majority of farmers is lack of up-to-date knowledge about pineapple cultivation technologies. New extension strategy should be used to develop favourable attitude of the farmers towards scientific practices so that, they can understand the importance of scientific recommendations and get benefitted from their harvests. For effective transfer of technology in agriculture now a day, it is essential to know which components of the technology the farmers are able to retain and to what extent. So, it is need of the hour to reduce the gap through appropriate training in new innovation. Thus, a blank recommendation for all categories of farmers will not serve the purpose. Category specific need and interests should be taken into consideration while planning any training programme for the pineapple growers of this

region. Information about the gap between technology advocated and technology adopted by the farmers shall help the extension personnel in designing appropriate extension strategy.

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Media Effectiveness on Rural Women in Haryana for Vegetables Cultivation

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ABSTRACT

The present study was conducted in four villages namely, Bhimnagar, Pali of Hisar and Milkpur and Bawanikhera of Bhiwani district of Haryana state. Fifty rural women involved in vegetable cultivation practices from each village were selected purposively, thus comprising a sample of 200 women. The impact of CD was found to be significant for gain in knowledge and change in attitude in all selected villages for all the messages regarding vegetable cultivation. There was a significant difference in the knowledge of rural women at pre and post-exposure stage for all the messages. Education ($r=0.257$), income ($r=0.241$), landholding ($r=0.179$) and area under vegetables cultivation ($r=0.180$) had positive and significant relationship with knowledge acquisition. Attitude change of rural women was found to be positively and significantly related to education ($r=0.296$), landholding ($r=0.180$) and area under vegetable cultivation ($r=0.185$). Therefore, it may be inferred that respondents who were having cultivation as their main occupation, educated, having higher income, large landholders and more area under vegetable cultivation had acquired knowledge and favourable attitude when exposed them to CD on vegetable cultivation practices.

Keywords: C.D., Attitude, Economics, Knowledge, Rural women, Vegetable

INTRODUCTION

India is the second largest producer of vegetables next to China with 2.8 per cent of the total cropped area and 15 per cent of the world's production under vegetables (Kumar *et al.*, 2011). Vegetable alone contribute 10.61 per cent of the total value of output from agriculture and increasing trends over the years (CSO, 2013). According to National Horticulture Board, during 2014-15, India produced 162.89 metric tons of vegetable with 9.39 million hectare area. However, the productivity is very low (17.3 metric tons per ha) in the country as compared to many other countries. Area, rate of production, productivity and yield obtained of most of the vegetables is low in the majority of vegetable growing states including Haryana due to the lesser knowledge of vegetable production technology.

There is a huge gap between the scientific recommendation technology of vegetable cultivation and their adoption level of rural farm women. Moreover, near about 70 per cent vegetables are grown in rural area and illiteracy rate are more in this area and also farmers and extension worker ratio are very high. Here exists a strong need for extension education and training for the growers to the vegetable production technology.

Women play an important role in the vegetable production. Most of the operations in vegetable production like seed treatment, sowing of seed, nursery raising, transplanting, thinning, irrigation, weeding, gap filling, fertilizers application, harvesting, picking, packaging, loading and unloading of produces and even sometimes marketing are also done by women. However, regardless

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of these variations, hardly any activities occurred in vegetable production in which women are not actively involved.

The media is playing an important role in passing on meaningful information at a faster rate to a large number of farm women in the country. It has emerged as one of the powerful sources of seeking relevant scientific information by our farm women. Anonymous (2009) reported that audio/video cassettes or C.Ds are only used for entrainment. Therefore, tapping and utilization of media for transferring the newly generated technologies regarding vegetable production among the Indian farm women is crucial and significant. This is mainly due to the fact that the vast majority of our farm women belong to remote and rural areas where facilities could not be arranged for sustainable individual or group approaches of technology transfer as it could be highly expensive and difficult in managing information infrastructure, therefore responsibilities and intervention of media in rural transformation is becoming more imperative and challenging. Emancipation of women is an essential pre-requisite for economic development and social progress of the nation. It is essential to evolve a pragmatic and realistic approach to women's development. There is an urgent need to develop the media on improved vegetable cultivation messages to strengthen the technical know-how. Therefore, the present study was planned to develop the relevant media on vegetable production so that rural women can be sensitized for self-reliance.

METHODOLOGY

The study was conducted in four phases and each phase having a distinct methodology. In phase I, two districts Hisar and Bhiwani were selected purposively from South-Western zone of Haryana. One block from each district viz., Hansi block from Hisar district and Bawanikhera block from Bhiwani district were selected randomly. From the selected blocks two villages from each block, *i.e.*, Pali and Bhimnagar villages from Hansi block, Milkpur and Bawanikhera villages from Bawanikhera block were selected randomly. Fifty rural women who involved in vegetable cultivation practices from each village were selected purposively, thus comprising a sample of 200 women. Background profile

of rural women in terms of socio-personal and economic variables also collected. For assessing the need of the rural women, an inventory pertaining to critical messages and sub-messages was prepared and categorized under three categories most needed, needed and least needed with scores 3, 2 and 1, respectively. Weighted mean scores were worked out and ranks were assigned. Messages having top three ranks and ten sub-messages from each selected messages got upper rank were finally selected for media preparation after consultation with Vegetable Science, Horticulture and Extension Education and Communication Management Department experts. In phase II, media in the form of CD for rural women was prepared on selected messages. Standard procedures for preparation of media were adopted. In phase III prepared media was administered to 30 judges of different departments, field functionaries and Home Scientists for effectiveness and feedback. Standardization was done in terms of reliability, validity and field applicability. In phase IV, the CD was exposed to 120 rural women out of 200 women four already selected villages *i.e.* 30 rural women from each village. The impact of media was assessed in terms of gain in knowledge and change in the attitude of rural women.

Considering the relevance of variables to the topic, a set of independent and dependent variables were selected for the present investigation. Total 13 independent variable *i.e.* background profile of rural women in terms of age, caste, marital status, family type, family size, education of the respondents, type of house, family occupation, income, landholding, area under vegetable cultivation, material possession, farm power possession and 2 depended variables *i.e.* gain in knowledge and change in attitude were considered.

The differences between pre and post exposure scores so obtained were taken as gain in knowledge. Attitude has been defined as the degree of positive or negative affect associated with some psychological object (Thurstone, 1946). A knowledge inventory and attitude statement was developed. Various statistical tools applied included Frequency and percentages, Paired 't' test and Correlation coefficient to find out the degree of relationship of the dependent variable with the independent variable.

RESULTS AND DISCUSSION

Rural women profile in terms of age presented in Table 1 revealed that 40 per cent of the respondents were of younger age group closely followed by middle age group (39%) and upper age group (21%), respectively. Caste wise distribution of respondents revealed that 38 per cent belonged to middle caste, 35 per cent were from upper caste and 27 per cent belonged to lower caste categories. The results concerned with marital status depicted that most of the respondents were married *i.e.* 87 per cent. Out of total sample, 59 per cent respondents belonged to the nuclear family system followed by joint family (41%) system. Thirty-six percent respondents had up to 5 members in the family followed by above 6

members (35%) and more than 8 members of the family (29%). Out of total respondents majority (60%) of them were illiterate followed by the primary (10%), educated to middle and secondary school (8%) each, senior secondary (5%) and 6 percent respondents who can read and write only. The Table clearly depicts that 57 per cent respondents had mixed type houses followed by the *pucca* house (41%) and *kaccha* house (2%), respectively. It is well exhibited in Table that 45 per cent of the respondents had cultivation as their main occupation whereas, 40 per cent respondents were found to be agriculture labourers followed by respondents who were in service (6%), caste wise occupation (5%) and business (4%), respectively. The study indicated that 45 per cent of the respondents had a monthly income between Rs. 5,001 to 10,000

Table 1: Background profile of rural women (N = 200)

S.No.	Variable	Category	Frequency	Percentage
Socio-personal and economic variables				
1.	Age	Younger (<30 yrs)	80	40
		Middle (31-45 yrs)	78	39
		Upper (>46 yrs)	42	21
2.	Caste	Lower	54	27
		Middle	76	38
		Upper	70	35
3.	Marital status	Married	174	87
		Unmarried	20	10
		Widow	06	03
4.	Family type	Nuclear	118	59
		Joint	82	41
5.	Family size	Small (Up to 5 member)	72	36
		Medium (6-8 member)	70	35
		Large (Above 8 member)	58	29
6.	Education of respondents	Illiterate	120	60
		Can read and write only	12	06
		Primary	20	10
		Middle	16	08
		Secondary	16	08
		Senior Secondary	10	05
		Graduate/Post graduate	04	02
		Technical/Vocational	02	01
7.	Type of house	<i>Katcha</i>	4	2
		Mixed	114	57
		<i>Pucca</i>	82	41

Table 1: contd...

S.No.	Variable	Category	Frequency	Percentage
8.	Family occupation	Cultivation	90	45
		Agril. Labourer	80	40
		Caste occupation	10	05
		Business	08	04
		Service	12	06
9.	Monthly income	Below Rs. 5,000	20	10
		Rs. 5,001-10,000	90	45
		Rs. 10,001-20,000	56	28
		Above Rs. 20,000	34	17
10.	Land holding	Land less	80	40
		Marginal (Upto 2.5 acre)	40	20
		Small (2.5-5.0 acre)	42	21
		Medium (5.0-7.5 acre)	24	12
		Large (Above 7.5 acre)	14	07
11.	Area under vegetable cultivation	No land	96	48
		1-2 acre	70	35
		3-4 acre	24	12
		5-6 acre	10	05
12.	Material possession	Low	72	36
		Medium	82	41
		High	46	23
13.	Farm powers possession	Low	154	77
		Medium	42	21
		High	04	02

followed by 28 per cent of the respondents who had income upto Rs. 10,001 to 20,000 followed by 17 per cent of the respondents who earn income above Rs. 20,000.

More than one-third of the respondents (40%) were landless whereas one-fifth of the respondents (20) per cent had land up to 2.5 acres and near about one fifth (21%) of the respondents had land 2.5-5.0 acres. The Table indicates that 48 percent respondents having no land regarding vegetable cultivation followed by 35 and 12 per cent who cultivated land between 1 to 2 acres, 3 to 4 acres for vegetables, respectively. Only 5 per cent respondents had cultivated land between 5-6 acres of vegetables. Data regarding material possession reveal that out of total sample, the majority of the respondents (41%) had medium material possession followed by low

(36%) and high material possession (23%), respectively. Data regarding farm power possession revealed that out of total respondents, the majority of the respondents (77%) had low farm power machinery followed by medium type (21%) farm power machinery. Similar findings were reported by Gita (2010) which revealed that most of the respondents were of younger age group, illiterate, married and having medium family education status, the joint family having 5-6 members and farming was their main occupation. Deepti (2008); Renu (2009) and Yadav (2013) also reported similar findings.

Sufficient gain in knowledge regarding vegetable cultivation practices was recorded for each message viz., tomato, okra and cucurbits cultivation practices. It may, therefore, be concluded that women succeeded in acquiring knowledge after exposing them to CD on

Table 2: Change in attitude of rural women regarding vegetable cultivation practices in selected villages of two district of Haryana (N=120)

Name of villages	Pre-exposure (Mean score)	Post-exposure (Mean score)	Change in attitude (Mean score)	't' values
Bhimnagar	31.40	42.83	11.43	10.56*
Pali	31.60	43.57	11.97	13.37*
Milkpur	30.77	43.93	13.17	13.99*
Bawanikhera	30.93	45.27	14.33	14.87*
Overall	31.17	43.90	12.73	13.20*

*Significant at 5% level of significance

vegetable cultivation practices. This reflects the effectiveness of the Compact Disc (CD). Similar results were also obtained by Jain (2005); Asrani (2006); Khurana *et al.* (2007); Sindhu and Thakur (2011) and Yadav (2013).

The pre-exposure, post-exposure and change in attitude mean scores along with 't' values have been presented in Table 2. It is evident that respondents had succeeded in changing their attitude at the post-exposure level. A significant change in attitude regarding all the selected messages of vegetable cultivation practices was observed in the selected villages viz., Bhimnagar and Pali village of Hisar district and Milkpur and Bawanikhera village of Bhiwani district of Haryana state separately as well as in the pooled sample. Similar results reported by Jain (2005); Kumari and Sethi (2012); Thakur and Verma (2012) and Yadav (2013).

Correlation analysis of impact of media on socio-demographic profile

In order to find out the relationship between socio-personal and economic variables with knowledge and attitude of the respondents, Pearson product correlation coefficient was applied. The data pertaining to these aspects have been presented in the following Table 3. It is evident that three variables viz education ($r = 0.483^*$ and $r = 0.939^*$), land holding ($r = 0.396^*$ and $r = 0.368^*$) and area under vegetables cultivation ($r = 0.360^*$ and $r = 0.392^*$) had positively and significantly correlation with knowledge acquisition and favourable attitude of the respondents in Bhimnagar village of Hisar district regarding vegetables cultivation practices, whereas all other variables were found to be non-significant. It may,

therefore, be inferred that respondents had cultivation as their main occupation, educated, having a *pucca* house, large land holders, more cultivated area under vegetables and had more favorable attitude and acquired knowledge through CD exposure regarding vegetable cultivation practices. Whereas in Pali village of Hisar district data indicated that knowledge acquisition of rural women was found to be positively and significantly correlated with age ($r = -0.367^*$), education ($r = 0.366^*$), monthly income ($r = 0.362^*$), landholding ($r = 0.356^*$), area under vegetables cultivation ($r = 0.396^*$). Regarding attitude of respondents to education ($r = 0.375^*$), land holding ($r = 0.357^*$), area under vegetables cultivation ($r = 0.365^*$) were found to be positively and significantly correlated. It may be, therefore, inferred that respondents having cultivation as their main occupation, educated, higher income, having a *pucca* house, large landholders and more cultivated area under vegetables had acquired more knowledge and having a positive attitude after exposure of CD.

Data regarding the relationship in Milkpur village of Bhiwani district indicated that as far knowledge acquisition was concerned four variables viz. education ($r = 0.411^*$), land holding ($r = 0.362^*$), and area under vegetable cultivation ($r = 0.375^*$) had a significant and positive relationship after exposure of CD. Regarding attitude of respondents to education ($r = 0.398^*$), land holding ($r = 0.360^*$), area under vegetables cultivation ($r = 0.364^*$) had significant and positive relationship after exposure of CD on vegetables cultivation practices. Means respondents who were having cultivation as their main occupation, educated, large landholders and more cultivated area under vegetable cultivation had acquired knowledge and favourable attitude when exposed them

Table 3: Correlation analysis of impact of media on socio-demographic profile of rural women regarding vegetables cultivation practices in selected villages of Hisar and Bhiwani districts of Haryana

Particulars	Villages									
	Bhimnagar (n=30)		Pali (n=30)		Milkpur (n=30)		Bawanikhera (n=30)		Overall (n=120)	
	Knowledge 'r' value	Attitude 'r' value	Knowledge 'r' value	Attitude 'r' value	Knowledge 'r' value	Attitude 'r' value	Knowledge 'r' value	Attitude 'r' value	Knowledge 'r' value	Attitude 'r' value
Age	-0.054	-0.053	-0.367*	0.175	0.162	0.153	-0.019	0.045	-0.070	0.078
Type of family	0.047	0.061	-0.051	-0.011	-0.134	0.246	0.043	-0.203	-0.017	0.157
Size of family	-0.244	-0.214	-0.034	0.181	-0.045	-0.007	0.001	0.237	-0.075	0.079
Education	0.483*	0.939*	0.366*	0.375*	0.411*	0.398*	0.367*	0.419*	0.257*	0.296*
Income	0.086	0.002	0.362*	-0.292	0.046	-0.091	0.413*	-0.005	0.241*	-0.101
Land holding	0.396*	0.368*	0.356*	0.357*	0.362*	0.360*	0.356*	0.354*	0.179*	0.180*
Area under vegetables cultivation	0.360*	0.392*	0.396*	0.365*	0.375*	0.364*	0.306*	0.317*	0.180*	0.185*

*Significant at 5% level of significance

to CD. Whereas in Bawanikhera village of Bhiwani district data showed that knowledge and attitude of rural women were found to be positively and significantly correlated with education ($r=0.367^*$ and 0.419^*), income ($r=0.413^*$), landholding ($r=0.356^*$ and 0.354^*) and area under vegetables cultivation ($r=0.306^*$ and 0.317^*) after exposure to CD on vegetables cultivation practices.

The data presented in Table 3 bring to light that the overall relationship between socio-personal and economic variables with gain in knowledge and change in attitude of rural women regarding vegetables cultivation practices in selected villages viz., Bhimnagar, Pali, Milkpur, and Bawanikhera of two districts Hisar and Bhiwani of Haryana indicated that education ($r=0.257^*$ and $r=0.296^*$), income ($r=0.241^*$), land holding ($r=0.179^*$ and $r=0.180^*$), area under vegetables cultivation ($r=0.180^*$ and $r=0.185^*$), were found to be positively and significantly correlation with knowledge acquisition and attitude change when exposed them to CD on vegetables cultivation practices. It inferred that respondents who were having cultivation as their main occupation, educated, having higher income, large landholders and more area under vegetables cultivation had acquired knowledge and favourable attitude when exposed them to CD on vegetables cultivation practices. Jain (2005); Asrani (2006); Asrani (2009); Gita (2010) and Yadav (2013) also support the findings. It could also establish a

relationship with education, occupation, income, landholding, and area under vegetable cultivation.

CONCLUSION

Regarding relationship between socio-personal and economic variables with gain in knowledge and change in attitude of rural women regarding vegetables cultivation practices in selected districts of Haryana indicated that occupation, education, income, land holding, area under vegetables cultivation were found to be positively and significantly correlated to knowledge acquisition and attitude change when exposing them to CD on vegetables cultivation practices. It may therefore, be inferred that respondents who were having cultivation as their main occupation, educated, higher income, large landholders and area under vegetables cultivation had acquired knowledge and favourable attitude when exposure them to CD on vegetables cultivation practices. It is quite encouraging to record that majority of the respondents were illiterate, yet succeeded in gaining sufficient level of knowledge and change in attitude after the media exposure. This highlights the importance of media exposure which could further be tried on other messages for the transfer of technology in Home Science, Agriculture, and allied fields.

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Extent of Adoption of Tomato Cultivation Practices among Farmers under Shade Nets in Kolar District of Karnataka

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ABSTRACT

Indian agriculture is severely affected from climate change, fragmentation of cultivable land, water scarcity, rapid urbanization, declining crop production and productivity, crash in market price, declining biodiversity, ever increasing population, increased demand for food especially vegetables. Protected cultivation has offered a new dimension to produce more in a limited area. The study was undertaken during the year 2016-17 in Kolar district. From each taluk respondents were selected by using purposive sampling procedure to constitute a sample size of 80 for the study. The study found that no one respondent raised nursery for seedlings. In case of cultural practices, with respect to ploughing, nearly two third partially adopted the recommended number of ploughings, no one adopted digging practice, whereas more than half of the respondents partially adopted the recommended size of bed and nearly half of the respondents belonged to partial adoption category of bed treatment for tomato cultivation. Variables such as annual income, extension participation, exhibited positive and significant relationship with adoption behaviour of respondents.

Keywords: Adoption, Correlation, Shade net, Tomato

INTRODUCTION

Agriculture is basically climate/season based and highly dependent on environment and it is very difficult to get favourable climatic conditions for crop growth and development as per crop need. Hot and humid climatic conditions characterized in rainy and post rainy season is most favourable for both crop and crop enemies. To raise a healthy disease free crop, spring-summer seasons are considered as most suitable. But, fast climatic changes happening across the globe has changed climatic characteristics of a season, which has resulted in untimely rains and other fluctuations in the spring-summer season, posing the challenge to develop climate resilient technologies. Not even that, with time extreme hot and

cold temperature stresses have been noticed in geographically varied locations where it was not supposed to be earlier based on various geographical factors deciding the climatic conditions of that area. Therefore, there is need to develop suitable technologies to sustain these challenges which may come up in the form of various biotic and abiotic factors (Singh, 2014). Protected cultivation technology offers the options to manipulate the climatic conditions and various other related stresses. Being a tricky technology highly depending upon intelligent implementation of protected structures for vegetable cultivation by having a knowhow on “*What, When, Where and Why*” to implement offers the basic benefit of extra protective shelter restricting or minimizing

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the exposure of the crops to various adverse factors. Even though the application of chemicals for controlling biotic stresses is also low under protected structures which gives a high quality safe vegetables for human consumption. By using protected structures, it is also possible to raise an offseason and long duration vegetables of high quality (Chandan *et al.*, 2015).

Vegetable farming in agri-entrepreneurial models targeting various niche markets of the big cities is inviting regular attention of the vegetable growers for diversification from traditional ways of vegetable cultivation to the modern methods (Singh *et al.*, 2015). Under the new era of Foreign Direct Investment (FDI) in retail, these kinds of models possess high potential for enhancing the income of farmers opting for quality and offseason vegetable cultivation through protected cultivation (Singh *et al.*, 2011). In 1965, Indo-American Hybrid Seeds (Pvt) Ltd., Bangalore first introduced greenhouse technology in India in commercial production of seeds, ornamental plants and cut flowers. During 1990, with support of Agricultural and Processed Food Products Exports Development Authority (APEDA), Ministry of commerce, Govt. of India, and several polyhouses are established by private entrepreneurs at Bangalore, Pune, Hyderabad and New Delhi. Defence Agricultural Research Laboratory (DARL), DRDO, at Pithoragarh and Chamoli districts successfully developed polyhouse vegetable production technology for capsicum, tomato, pea, brinjal etc in winter season. In recent years protected cultivation has offered new dimension to produce more in a limited area in Kolar district. An attempt has been made to analyse the adoption behaviour of farmers about tomato cultivation practices so that suitable training programmes and suggestions can be offered for its scaling to non-traditional region of the state.

METHODOLOGY

The study was undertaken during the year 2016-17 in the selected three taluks of Kolar district of Karnataka state. Based on maximum number of shade net structures under protected cultivation, Kolar, Malur and Mulbagal taluks were selected for the study. From each taluk 32, 28 and 20 respondents were selected by using purposive sampling procedure to constitute a sample size of 80 for

the study. Majority of the farmers are growing capsicum and tomato under protected cultivation (Shade net). In the present study adoption referred to the acceptance and practice of some or all the recommended protected cultivation practices of capsicum and tomato crops by the respondent. The scores for each one of the individual practices adopted were arrived at considering the relative importance of the items in consultation with specialist of Indian Institutes of Horticultural Research, Bangalore. The answers elicited from the farmers were compared and quantified by giving score of 2, 1 and 0 for full adoption, partial adoption and non adoption, respectively. The full adoption was referred as the completely adopting recommended practices in their protected cultivation structure (Shade net) and partial adoption is the slightly deviation from the recommended practices/dosage. The non adoption is the adopting the cultivation practices other than recommended practices/dosage. Based on the total scores, the respondents were grouped into three categories as low, medium and high by using mean and standard deviation as a measure of check as suggested by Sengupta (1967) and followed by Singh (2010). Karl Pearson correlation coefficient was calculated to find out the relationship of adoption with socio personal and economic variables.

RESULTS AND DISCUSSION

Adoption behaviour of farmers about tomato crop cultivation practices under protected cultivation

Pursuant to Table 1 it can be seen that none of the respondent raised nursery for seedlings. The probable reason might be lack of extension functionaries' effort from respective departments. Most of the farmers were using 'Abhinava' as a tomato hybrid which is high yielding, resistance to leaf curl disease and nematode infestation from Syngenta private seed company. In case of cultural practices, with respect to ploughing, nearly two third (62.50%) of the respondents partially adopted the recommended number of ploughings (2-3 times). On the other hand, none of the respondents adopted the digging practice, whereas more than half (53.75%) of the respondents partially adopted the recommended size of bed (1 meter width, 15 cm height and 0.5 meter between the rows) and nearly half (48.75%) of the respondents

Table 1: Distribution of respondents according to adoption behaviour of farmers about tomato crop cultivation practices under protected cultivation (n=80)

S.No.	Package of practices	Recommended dosage/acre	FA		PA		NA	
			F	%	F	%	F	%
I	Nursery Raising							
1.	Seed rate	200 gm	0	0	0	0	80	100
2.	Growing media	Coco peat	0	0	0	0	80	100
3.	Depth of sowing	0.5 cm	0	0	0	0	80	100
II	Cultural practices							
1.	Ploughing	2-3 times	30	37.50	50	62.50	0	00.00
2.	Digging		0	0	0	0	80	100
3.	Bed preparation	1 meter width and 15 cm height and 0.5 meter between the rows	25	31.25	43	53.75	12	15.00
4.	Bed treatment	Formaldehyde @ 4%	29	36.25	39	48.75	12	15.00
5.	FYM application	80 tons	24	30.00	56	70.00	0	0
6.	Mulching							
a.	Residue mulching		3	3.75	0	0	77	96.25
b.	Plastic mulching	400 gauge of 100 micron and 5 cm diameter of holes	19	23.75	45	56.25	16	20.00
III	Transplanting							
1.	Selection of cultivars	Naveen and Sun 7611	0	0	0	0	80	100
2.	Age of Seedlings	35-40 days	23	28.75	57	71.25	0	0
3.	Seedling rate	18000-20000	19	23.75	61	76.25	0	0
4.	Seedling treatment	Imidachlopride@ 0.1ml/ltr	21	26.25	45	56.25	14	17.50
5.	Spacing	60X45cm	31	38.75	49	61.25	0	0.00
6.	Seedling treatment one day after transplanting	Copperoxychloride @ 0.3%	11	13.75	56	70	13	16.25
IV	Fertilizer management							
1.	Inorganic Fertilizers	60:60:60	13	16.25	54	67.50	13	16.25
2.	Organic fertilizers	200 kg (Neem Cake)	26	32.5	40	50.00	14	17.50
3.	Biofertilizers							
3.1	<i>Tricoderma viridae</i>	2 kg	6	7.5	38	47.50	36	45.00
3.2	<i>Psuedomonas</i>	2 kg	4	5.00	46	57.50	30	37.50
V	Pruning	28 DAP @ interval of 3-4 days	37	46.25	29	36.25	14	17.5
VI	Training	30 DAP	22	27.5	42	52.50	16	20.00
VII	Deleafing	70DAP	3	3.75	17	21.25	60	75.00
VIII	Drip irrigation and Fertigation							
1.	Irrigation	Half an hour per day	24	30.00	56	70.00	0	00.00
2.	Fertigation	3 rd week after transplanting and twice in a week	21	26.25	47	58.75	12	15.00
3.	Recommended fertilisers							
a.	19:19:19	15 kg	18	22.50	46	57.50	16	20.00

Table 1 contd....

S.No.	Package of practices	Recommended dosage/acre	FA		PA		NA	
			F	%	F	%	F	%
IX	Integrated Pest Management							
1.	Cultural method	Summer ploughing/soil solarisation	68	85.00	0	0	12	15.00
		Burning of previous crop plant residues	57	71.25	0	0	23	28.75
		Crop rotation	80	100	0	0	0	0
		Growing of trap crops like Marigold, Bhindi etc.,	46	57.50	0	0	34	42.50
2.	Mechanical method	Nylon mesh	75	93.75	0	0	5	6.25
		Removal of infested parts of the plants (viral diseases)	74	92.50	0	0	6	7.50
		Light traps (6 traps/acre)	26	32.50	40	50.00	14	17.50
		Pheromone Traps (4-5)	10	12.50	60	75	10	12.50
3.	Chemical methods							
a.	Mites	Dicofol @ 2 ml/litre	21	26.25	33	41.25	26	32.50
b.	Thrips	Acephate @ 1.5 g/litre	23	28.75	45	56.25	12	15.00
c.	Fruit borer	Corboryl @ 0.1%	21	26.25	46	57.50	13	16.25
d.	White flies	Imidacloprid @ 0.4%	17	21.25	49	61.25	14	17.50
e.	Root knot nematode	Corbofuran @ 20 kg/acre	22	27.50	45	56.25	13	16.25
4.	Biological method							
a.	Nematodes	Neem cake @ 800 kg/ acre 4-5 days before transplanting to the beds	35	43.75	32	40.00	13	16.25
b.	Aphids and mites	Pongamia oil @ 5-8 ml/L	19	23.75	48	60.00	13	16.25
X	Harvesting	75-85 DAP	29	36.25	38	47.50	13	16.25

FA=Full Adoption, PA=Partial Adoption, NA=Non Adoption, F=Frequency, %= Per cent

belonged to partial adoption category of bed treatment (@ 4% formalin for tomato cultivation). The majority (70.00%) of the respondents partially adopted the recommended FYM application (80 tons). In case of mulching, more than three fourth (96.25%) of the respondents did not use crop residues as a mulching and more than half (56.25%) of the respondents partially adopted the recommended plastic mulching (400 gauge of 100 micron and 5cm diameter of holes). The probable reason might be that, low education leads to less knowledge and high cost involved in cultural practices of tomato under shade net.

In case of transplanting, none of the respondents cultivated any recommended tomato cultivars (Sun 7611 and Naveen) under shade net, majority (71.25, 76.25, 56.25 and 61.25%) of the respondents partially followed the recommended age of the seedlings (35-40 days),

seedling rate (18000-20000), seedling treatment (Imidachlopride @ 0.1 ml/L) and spacing (60X45 cm) respectively. Nearly three fourth (70.00%) of the respondents partially followed the drenching of one day transplanted seedlings (Copper oxychloride @ 0.3%). The possible reason for this might be that, lack of knowledge about recommended practices. Majority (67.50% and 50.00%) of the respondents partially adopted the recommended dosage of inorganic fertilizers (60:60:60) and organic fertilizers (200 kg Neem Cake) respectively. In case of bio fertilizers, 47.50 per cent and 57.50 per cent of the respondents partially adopted the recommended dosage of bio fertilizers respectively. The probable reason might be that, lack of knowledge about fertilizer management, non availability and high cost. Regarding training and pruning, more than half (46.50%) of the respondents fully adopted the recommended days

for pruning (28 DAP @ interval of 3-4 days) and more than half (52.50%) of the respondents partially adopted the recommended days of pruning (30 DAP @ interval of 8-10 days). Whereas, three fourth (75.00%) of the respondents did not adopt the de-leafing practice. The lack of information and technical knowledge regarding the pruning besides higher labour cost, complexity in practice and lack of skill to practice might have favoured the situation. With regard to irrigation and fertigation, nearly three fourth (70.00%) of the respondents partial adopted the recommended duration for irrigation (Half an hour a day). On the other hand, nearly two third (58.75%) of the respondents partially adopted the recommended time for fertigation (3rd week after planting and twice in a week) and 57.50 per cent of the respondents partially adopted the recommended dosage of water soluble fertilizers (19:19:19 @ 4 kg). The lack of technical information about irrigation, fertigation and high cost may be the reason for above research findings.

The results of Integrated Pest Management (IPM) as evident from the Table shows that majority (85.00%) of the respondents had full adoption of summer ploughing practice. On the other hand, nearly three fourth (71.25%) of the respondents adopted the recommended burning of previous crop plant debris, whereas, cent per cent respondents fully adopted the recommended crops for rotation like marigold, cauliflower etc and more than half (57.50%) of the respondents fully adopted the recommended trap crops like marigold, sweet corn, bhindi etc. The past farming experience and lower cost is the probable reason for above findings. Regarding mechanical method, three fourth (75.00%) of the respondents had partially adopted the recommended pheromone traps (4-5 traps) for pest control, whereas overwhelming (93.75%) of the respondents fully adopted the recommended nylon mesh for pest control. In case of removal of infested parts of the plants, 92.50 per cent of the respondents were in full adoption category and 50 per cent of the respondents partially adopted the recommended light traps (6 light traps/acre). The possible reason might be lack of scientific information and skill training about IPM practices.

Majority (41.25%) of the respondents had partially adopted the recommended plant protection chemicals

such as Dicofol @ 2 ml/L for mites management, whereas more than half (56.25%) of the respondents partially adopted the recommended plant protection chemicals such as Acephate @ 1.5 g/L for thrips control. On the other hand, more than half (57.50%) of the respondents partially adopted the recommended chemicals such as Carbaryl @ 0.1 per cent for fruit borer management and nearly two third (61.25%) of the respondents partially adopted the recommended chemicals such as Imidacloprid @ 0.4%, meanwhile, more than half of the (56.25%) of the respondents partially adopted the recommended chemical such as Carbofuran (20 kg) for nematode management. The possible reason might be lack of scientific information and higher plant protection chemicals and labour cost. In case of biological method, nearly half (43.75%) of the respondents had fully adopted the recommended bio pesticide such as neem cake (800 kg) for nematode control, whereas nearly two third (60.00%) of the respondents partially adopted the recommended bio pesticide such as Pongamia oil (5-8 ml/L) for aphids and mites control. Above all, non availability of biocontrol agents as expressed by respondents might be the possible reason for lesser adoption. Nearly half (47.50%) of the respondents partially adopted the recommended days for harvesting of capsicum (75-80 DAP).

Relationship between socio-economic profile of respondents and extent of adoption

Table 2 shows that, variables such as annual income, extension participation, exhibited positive and significant relationship with adoption extent of respondents at 1 per cent level of significance. Whereas, age, education, farming experience, size of land holding, social participation, mass media utilization, information seeking behaviour, risk orientation, management orientation, scientific orientation and source of finance exhibited positive and significant relationship at 5 per cent level of significance. Results are in support of that of Roy *et al.* (2015). With respect to relationship of independent variables with extent of adoption of tomato, variables like annual income, extension participation, exhibited positive and significant relationship at 1 per cent level of significance. On the other hand, age, education, farming experience, size of land holding, social participation, mass

Table 2: Relationship between socio-economic profile of respondents and extent of adoption of capsicum and tomato cultivation practices

Independent variable	Karl Pearson's 'r' value	
	Adoption of capsicum cultivation practices under shade net	Adoption of tomato cultivation practices under shade net
Age	0.328*	0.428*
Education	0.227*	0.316*
Farming experience	0.308*	0.472*
Size of Land holdings	0.377*	0.325*
Annual income	0.421**	0.259**
Social participation	0.165*	0.229*
Extension Participation	0.281**	0.245**
Mass media utilization	0.220*	0.216*
Information seeking behaviour	0.120*	0.138*
Risk orientation	0.563*	0.407*
Management orientation	0.458*	0.585*
Scientific orientation	0.310*	0.452*
Source of finance	0.125*	0.258*

media utilization, information seeking behaviour, risk orientation, management orientation, scientific orientation and source of finance exhibited positive and significant relationship in case of capsicum cultivation practices at 5 per cent level of significance.

CONCLUSION

The protected cultivation is one of the interventions for climate smart agriculture. The study found that majority of the respondents belonged to partial adoption category with respect to adoption behaviour of tomato and capsicum crop cultivation practices under shade net and no one farmer adopted the recommended tomato cultivar under shade net. This bring to focus that it is of utmost importance to design more number of extension activities like demonstrations, study tours, exposure visits to convince the farmers about cultivation practices of capsicum for full adoption under shade net technology.

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Perceived Problems and Suggestions of Farmers regarding Kisan Call Centre

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ABSTRACT

Availability of appropriate information at right time and communication of information have been most important factors for increasing agricultural production. There is flood of information but which information will be useful where and for whom and how to take it to the needy people has been a big challenge. Farmers need a bunch of information in agriculture at every stage ranging from improved crop cultivation practices, weather forecast, hybrid seeds, inputs for cultivation, insect, pest and disease management, storage facility and price of agricultural produce. Farmers can get information from number of ways including trial and error. Important information related to agriculture is neither symmetric nor costless. The study was conducted in Varanasi district of Uttar Pradesh to know the problems faced by the farmers to using kisan call centre. Ex-post facto design was used for the research and snow ball sampling was used for selecting 150 respondents and data was collected with the help of well-prepared schedule. Data was analyzed by using chi square test for finding association among dependent and independent variables.

Keywords: Communication gap, Information, Technology

INTRODUCTION

It is very necessary to disseminate the new technology and updated information related to agriculture, to each and every farmers for full utilization of technology which lead and support to rapid growth and improvement in livelihood of the farmers and development of agriculture sector as well as grand domestic product (GDP) of nation. The growth rate of agriculture sector is continuously decreasing and during 2017-18 it was 6.5 per cent in comparison to 8.0 per cent in 2015-16 and 7.10 per cent in 2016-17. It is estimated that the population will cross over 150 crore till 2050 and the demand of food will be double during 2050. Information and communication technology have potential to fulfil the future demand of the population and it can be improved through escaping the information gap between farmers and research agency

(Khan *et al.*, 2010). This information gap may be fulfilled by extensive use of ICT tools in agriculture (Lalsey, 2001).

The initiative has been started by Ministry of Agriculture and Farmers Welfare, Govt. of India through launching the scheme *Kisan Call Centre* on 21 January 2004 to handle the queries of the farmers on the spot in their own dialect and it has been provided the toll free No 18001801551 and 1551 for BSNL landline which is accessible through any mobile phone. The service to asking queries and providing solution & information to the farmers from 6 AM to 10 PM in seven days of a week. Now it is available in 24 different languages. Kisan call centre is providing information to the farmers at three levels on the basis of queries. Kisan call centre agency provides a bridge to connect the farmers, research specialist, subject matter specialist and other research

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agencies working in agriculture. It provides a panel for discussion about location specific problems. It helps to the rapid distribution of technology among farmers and is also helpful to identify the location specific problems and develop the location specific solutions through accessing the timeline of farmer's queries. One can assess and identify the major problems and cause of problems through checking the farmers call history. It may also be helpful to the policy makers to identify the weak section and much needed area for development. It is helpful to the researchers in developing the location specific and demand driven technologies for proper growth and development of the specific farmers. Gradually the awareness and use of *kisan call centre* is increasing among farmers.

METHODOLOGY

The study was conducted in purposively selected Varanasi district of Uttar Pradesh. Nine villages were purposively selected in Harhua block of Varanasi and snowball sampling method was used for selecting 150 respondents who made a call to kisan call centre either regularly or occasionally. Data was collected through interview schedule. The data were collected directly by researcher interviewing the respondents. The statistical

methods such as frequency, percentage, mean, standard deviation were used to qualify variables.

RESULT AND DISCUSSION

The problems related to the calling kisan call centre are summarized in Table 1 where it is evident that maximum of the respondents/farmers (65.33%) reported network problem, poor connectivity and inadequate distribution network of agricultural inputs mostly in rural areas was major problems. Lack of awareness about KCC (56.0%), and 45.33 per cent farmers were not interested, 39.33 per cent caller found busy network of KCC agency, 32 per cent solutions provided by KCC were obsolete, 25.33 percent faced problem of affordability of the mobile phone. However, 27.33 percent of the farmers reported that call on hold, followed by unable to understand the actual problems of the farmers (23.33%), not provided updated information regarding seed, pesticide etc. were the problems of farmers (20.66). Some of the findings are similar to that of Slatthia *et al.* (2011). To substantiate the quantitative finding the case studies have been reported which were observed by researcher during data collection directly in field condition. It include case with negative perception of the respondents/farmers towards kisan call centre in which

Table 1: Problems faced by farmers in getting services of kisan call centre

S.No.	Problems	Frequency	Percentage	Rank Order
1	Inadequate distribution network of agricultural inputs in rural area	98	65.33	I
2	Lack of awareness among people about the kisan call centre	84	56.00	II
3	Farmers themselves are not interested	68	45.33	III
4	Phone line of kisan call centre was found busy	59	39.33	IV
5	Kisan call centre gives obsolete information	48	32.00	V
6	Most of the time kisan call centre agents put farmers call for waiting	41	27.33	VI
7	High initial cost of buying telephone /mobile	38	25.33	VII
8	Personnel of kisan call centre are sometimes unable to understand the farmers' problem	35	23.33	VIII
9	Kisan call centre is not providing the updated information regarding the seed, pesticide, etc. products of private companies	31	20.66	IX
10	Kisan call centre personnel are not well prepared to answer the farmers questions which leads to confusion about the technology	20	13.33	X
11	Experts do not have answer to questions of farmers	12	8.00	XI
12	Information was not relevant to agricultural operations of farmers	4	2.66	XII

researcher tried to feel the grassroots problems faced by farmers during the query time and reply of KCC agents. In first case Mr. Abhishek Dubey, (farmer from Bhavanipur village of Varanasi) called KCC in July 2018 after the harvesting of fruits from his 10 years old mango tree (variety Duseheri) regarding proper fertilizer and nutrient management. As per record provided his tree was fabulous in production, and taste of fruits. Response of the Farm Tale Advisor which was in first level advised the farmer to take dry dung and urea, mixed it with soil and spread around the roots of tree. The result was disturbing as after the application of dry dung there was severe attack of the termite resulting drying of tree. Such experience created highly negative attitude towards KCC. Another experience of Mr. Rajendra Prasad, (a farmer from village Bhavanipur) called during February 2019. to KCC regarding the control of weeds in vegetable field he was advised chemical control with the herbicide which has been either closed or not available in the market, even once he was suggested to use Endosulfan for pest control which is banned due to its residual effect. Ms. Rajendra Prasad share that they don't get the updated information related to pesticide and herbicide for effective control of insect, pest and weeds in vegetable.

CONCLUSION

From the findings it can be concluded that majority of the farmers had faced the problems related to inadequate and poor connection of network mostly in rural areas along with lack of awareness and out of date information provided by KCC agency. The findings of the study may help to identify the growth and current

status of the kisan call centre. The findings of the study providing the weakness and problems faced by respondents may have policy implication in order to update the knowledge and working of KCC Agency.

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Training and Marketing Channel as Determinant of Empowerment of Rural Self Help Group Women Members

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ABSTRACT

The present study was conducted on 120 randomly selected respondents from *Bhiwani* and *Bawani Khera* blocks of Bhiwani district of Haryana state. The study revealed that majority of the respondents belonged to the young age group, illiterate, belonged to nuclear families of medium family size. Hundred per cent of the respondents were active with social participation in one organization. Training received score was obtained highest for income generation (weighted mean score 2.00 and rank I), followed by loaning and dairy and agriculture ranked II and III respectively. Similarly for marketing channels 'individual sale mode of marketing' ranked first, followed by 'group contacts with shopkeeper in village/nearby village', 'group contacts with shopkeepers in cities' and 'group sale' respectively. Association between independent variables with training and marketing channels was found positively correlated. It was interesting that a negligible percentage of respondents performed tasks of income generating activities and marketing which were not fruitful for them.

Keywords: Income generation, Marketing channel, Respondents, Self Help Groups, Training received, Women

INTRODUCTION

Self-help groups (SHG) are fast emerging powerful tool of socio-economic empowerment of the poor in rural areas (Prusty *et al.*, 2015). India has long taken efforts to expand credit availability to rural areas. Early programs, which often yielded disappointing results, were gradually replaced by efforts to establish self-help groups (SHGs) and link them to banks (Deininger and Liu, 2009). The SHG promotes small savings with a bank among its members. This common fund is in the name of the SHG (Mazharunnisa, 2014). Empowerment can be viewed as means of creating a social environment in which one can make decisions and make choices either individually or collectively for social transformation. It strengthens the innate ability by way of acquiring knowledge, power and experience (Sain and Kaware, 2011). In the last five decades, the concept of women empowerment has

undergone a sea change from welfare oriented approach to equity approach. It has been understood as the process by which the powerless gain greater control over the circumstances of their lives (Nayak and Mahanta, 2009).

Training results in systematic improvement in knowledge and skills which help the women to perform their tasks effectively and efficiently. Trainer should never lose sight of the fact that systematic procedure for planning and implementing training programmes starts with identification of training needs and training is effective, provided it is based on systematic assessment of training needs (Singh, 2000). Further training efforts should be devoted to produce qualitative results for sustainable development through need based training. The training provided for the self help group members should be fruitful so that they can earn and are capable of raising their living standards. Marketing through SHG may prove

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fruitful as a distribution strategy as women in the groups are having a high percentage of population and are willing to undertake entrepreneurial activities. As a channel member they can serve as opinion leaders to prospective customers as they are full of confidence and good communication skills (Nair, 2012). Though less educated still capable of understanding this business concept would help them convincing the rural population to buy products and services from them. It is difficult to sell homemade products in the absence of capacity building and marketing training but it is comparatively easy to enter through readymade (Branded) products of well known manufacturers. So it is contemplated in the paper that Self Help Groups can help products/services providers to penetrate this billion dollar rural market with least inventory piling up and at low cost.

Self Help Groups are producing a wide variety of products like bakery, (masala), pickles, chutney confectionery, toys, paper products, chalk, candle, agarbattis, spices, greeting cards, painting on fabrics, herbal products, dairy products, pottery, vessel making, etc. the distribution of the products is one of the main problem. Sometimes, their discount policy adversely affected the consumer buying behaviour; as they felt the quality of SHG products was of sub standardized which in turn reduced the sales volume and profit margin of their respective units, SHGs are struggling with this very hard to handle this (Maheshwari and Gupta, 2016). The channel of distribution is the route through which the product passes from the hands of manufacturers to the hands of consumers. The decisions regarding channels of distribution influence greatly the availability of the right product in the right condition at right time and right place which, in turn, affect the success of the marketer and the level of customer satisfaction. In India, SHGs are following their traditional practices regarding the channels of distribution. It appears that they do not have any knowledge to make the system of distribution efficient. Therefore, our micro-enterprises especially SHGs have to understand the concept of marketing strategies through proper marketing segmentation, channel choice and effective mix of other marketing elements to get substantial invulnerable edge or differential advantage over the rivals (Kumari and Sehrawat, 2016). The study

has been conducted with the objective of understanding the process of innovative marketing channels and mode of marketing and training requirements in the SHG sector to draw lessons from the success stories to upscale and replicate in a similar socio-politico-economic scenario in other parts of the country.

METHODOLOGY

The present study was conducted purposively in Bhiwani district of Haryana as at present there are 28,842 total SHGs in Haryana with a total no. of number 3, 11,117 members, whereas in Bhiwani district there are 3,154 total working SHGs with 33,810 members (Anonymous, 2018). Primary data on rural women of self help groups was collected by applying purposive and systematic random sampling procedures for the selection of respondents. First, two blocks Bhiwani and Bawani Khera were selected randomly from the district for the study. Two villages from each district selected randomly namely, Tigrana and Bamla from Bhiwani and Jamalapur and Kungar from Bawani Khera for the study. Finally, thirty women were selected randomly from each selected village, thus making a total sample of 120 respondents. The data were collected with the help of a well structured and pretested interview schedule comprising the items for assessment of their training requirements and marketing channels adoption. The training and marketing channels needs were computed with the statistical measures like frequency score, percentages, mean, standard deviation, weighted mean score, ranks and correlation analysis were used to analyze the data to draw the tangible inferences from the study.

RESULTS AND DISCUSSION

The results along with relevant discussion have been presented in prime heads as socio-personal and socio-economic characteristics of the respondents, communicational profile, training requirements, marketing channel needs and association between socio economic profile and training received and marketing channels adopted by the rural women of different self help groups.

The data on socio economic variables revealed that the majority of the respondents (57.50%) belonged to

the young age group, it was probably due to the reason that young and middle aged people were more energetic than the old aged people. Such kind of discussion supported by study of Bharathi *et al.* (2009) said that young and middle aged women are generally enthusiastic and innovative in nature and have more strength, vigour, challenging and interest to earn more money. Considering the educational status of respondents, the data revealed that 37.50 per cent of the respondents were illiterate, Majority of the respondents were illiterates and the reason may be due to poor educational facilities in rural areas, restrictions in the family for the girls to be inside four walls of house and absence of schools in the village or nearby villages. Hence, it may be concluded that the members had considerably good educational standards. Similar finding was also reported by Rangi *et al.* (2002). Majority, 82.50 per cent of the families belonged to the nuclear type of family with a medium size number of the members. The results are in conformity with the earlier findings of Singh (2011). Concerning annual family income, it was observed that the majority of the respondents (49.20%) belonged to high annual family income, may be due to the existence of a mixture of members having well salaried government job employees to households having very low waged labourers. Puhazhendi and Badatya (2002) revealed that after joining the SHG the average annual income of the respondents increased from 6.00 to 35.00 per cent. Further, the table revealed that 100.00 per cent respondents had small land holding size including leased land. Similar findings were reported by Anjugam *et al.* (2007). Concerning the major occupation, majority (63.34%) of the respondents working as electricians, mechanics, shopkeeper, etc. falling under others category, followed by labour + agriculture (23.33%) and agriculture + dairy (13.33%). Similarly, reported by Devalatha (2005). 100 per cent of the members had participated in one organization. Therefore, the more number of the respondents participated in different social activities after joining the SHGs may be due to realization and awareness of their responsibility in the society. Sharma and Verma (2008) mentioned that SHGs were successful in empowering rural women through income generating activities. It can influence increase in income, expenditure and saving habits or rural women. The majority of the respondents (65%) possessed electric

motors followed by power tillers as their farm power. In terms of agricultural implements 100.00 per cent respondents having *pata*, *kudal* and shovel followed by 13.00 per cent had MB plough, desi plough and sprayers. The 100.00 per cent respondents had basic household materials as required to run their daily life. 100 per cent respondents had cycles and motor bikes for their daily movement purposes. 100.00 per cent possessed television, smart phones as communication material followed by 35.00 per cent subscribing printed materials.

Table 1: Communication profile of the respondents (n=120)

Variables	Class range	Frequency	Percentage
Extension contact			
Low	15-17	45	37.50
Medium	18-20	62	51.66
High	Above 20	13	10.83
Mass media exposure			
Low	15-17	25	20.83
Medium	18-20	77	64.16
High	Above 21	18	15.00
Source of information seeking behaviour			
Low	11-15	27	22.50
Medium	16-20	69	57.50
High	Above 21	24	20.00

The data in Table 1 revealed that the majority of the respondents had medium extension contact followed by low (37.50%), medium (51.66) and high (10.83%). In case of mass media exposure, it is clear that the majority of the respondents had medium (64.16%) exposure for gaining information from various sources followed by low (20.83%) and high (15.00%) exposure. Similarly, Mayuri (1998) explained that television is a powerful medium to mobilize opinion on many issues related to women's groups, the same was also reported by Ramasubramanian and Manoharan (2003) in their study. In case of source of information seeking behaviour, the majority of the respondents (57.50%) fall under medium category for sources of information, followed by low (22.50) and high (20.00). Hence, it can be concluded that informal sources of information seemed to be most important as generally utilized by most of the members. Similar results were

Table 2: Trainings profile of the SHG members

Category	Frequency		Total weighted score	Weighted mean score
	Yes (2)	No (1)		
Training type				
Income generating	120 (100.00)	00 (00.00)	240	2.00
Dairy and Agriculture	40 (33.3)	80 (66.7)	160	1.34
Loaning	63 (52.5)	57 (47.5)	183	1.52
No. of Trainings Received				
1-2	87 (72.5)	33 (27.5)	207	1.72
2-4	59 (49.2)	61 (50.8)	179	1.49
More than 4	00(00.00)	120 (100)	120	1.00
Place of Training				
Village	120 (100.00)	00 (00.00)	240	2.00
District Head Quarter	62 (51.7)	58 (48.3)	182	1.51
Neighbouring Village	43 (35.8)	77 (64.2)	163	1.35
Duration of Training				
2-4 days	120 (100.00)	00 (00.00)	240	2.00
One week	00 (00.00)	120 (100.00)	120	1.00
One month	00 (00.00)	120 (100.00)	120	1.00

reported by Bhagat *et al.* (2004). The formal and mass media information sources were also utilized by the members with considerable extent.

Training is one of the determinants of income improvement of women member of SHG. The data in Table 2 reveals training profile of the group members. The findings indicates that income generation training type was attended by all the respondent. Majority of the respondents were found in 1-2 number of training group (weighted mean score 1.72) followed by for 2-4 days (weighted mean score 1.49).

Marketing channels adopted by the members to improve their sale of products

From the findings in Table 3 it can be concluded that the different marketing channels were adopted by the respondents, majority of the members were involved in individual sale of their products with weighted mean 1.67 followed by group contacts with shopkeeper in village/nearby village, group contacts with shopkeepers in cities and group sale with weighted means 1.56, 1.55, and 1.20 respectively. Hence, it can be concluded that the best

mode of marketing adopted by the respondents of SHG have increased the women members spending capacity as they are selling their prepared products through self sale mode or individual method and earning more money directly without any intermediaries. Similar findings were earlier reported by Goankar (2011), where it was observed that sales and profits of SHGs was not affected by the number of employees per group and the sales revenues remained almost same irrespective of number of group members enrolled.

Association between socio economic profile and training received and marketing channels

Correlation of independent variables with the training received and marketing channels adopted by the respondents indicated in the Table 4 and shows that age, education, family type, family annual income, social participation, extension contact and mass media exposure were positively correlated with trainings received, whereas, family size was found non-significant with the training received by the respondents. The data for marketing channels adopted by the respondents shows that age, followed by education, family annual income,

Table 3: Marketing Channels used by members (n=120)

Category	Frequency		TWS	WMS	Rank
	Yes (2)	No (1)			
Individual sale	80(66.70)	40(33.30)	200	1.67	I
Group contact with shopkeepers in villages/nearby villages	68(56.70)	52(43.30)	188	1.56	II
Group contacts with shopkeepers in cities	66(55.00)	54(45.00)	186	1.55	III
Group sale	24(20.00)	96(80.00)	144	1.20	IV

Table 4: Association between socio economic profile and training received and marketing

Independent variables	Training received	Marketing channels
Age	0.321*	0.943*
Education	0.970*	0.552*
Family type	0.452*	0.098 ^{NS}
Family size	0.128 ^{NS}	0.105 ^{NS}
Family annual income	0.569*	0.469*
Social participation	0.882*	0.589*
Extension contact	0.258*	0.457*
Mass media exposure	0.398*	0.518*

*Significant level = 0.05, NS= Non significant

social participation, extension contact and mass media exposure were positively correlated, whereas, family size and family type were found non-significant with the marketing channels used by the respondents for the sale of their products prepared by them for gaining income.

CONCLUSION

The findings revealed that besides contributing towards economic development, these groups are important for social networking. Group's involvement also helped to establish appropriate marketing relationships and input costs. Majority of the respondents were found with active social participation in one organization. Extension contacts of majority of the respondents was found with the gram pradhan/local leaders and SHG officers/workers. Mass media exposure of the majority of the members was found dependent on the internet and televisions for gaining information Majority of the respondents (72.50%) received 1-2 training regarding income generation at their villages for 2-4 days in a month. These training provided for the members of the group

improved their income and proved helpful in their works with new innovative ideas which attract the customers for their work. The majority of the respondents were selling their products or providing their services to consumers through individual sales.

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Impact of Front Line Demonstrations on the Yield and Economics of Pulse Crops in Burhanpur District of Madhya Pradesh

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ABSTRACT

The study was carried out in adopted villages of Krishi Vigyan Kendra, Burhanpur during 2013-14 to 2018-19. Total 100 front line demonstrations were conducted on pulses i.e. black gram, soybean, pigeon pea, chickpea and green gram in 40 hectare by the active participation of the farmers for adoption of improved technologies of pulse production potentials. The improved technologies included use of new variety and full package of practices i.e. seed treatment, integrated nutrient management, integrated pest management, irrigation, harvesting, storage and post-harvest management. FLD plot recorded higher yield as compared to farmer's local practice. The mean data revealed that an average yield recorded was 15.74 q/ha under demonstrated plots as compare to farmers practice 12.50 q/ha. Additional yield over local check was 3.04 q/h with percent increased yield of 19.38 per cent. The improved technologies gave higher gross return (Rs 65870/ha), net return (Rs. 46510/ha) with higher benefit cost ratio (3.09) as compare to farmer's practice (2.52).

Keywords: Pulses, FLDs, Technology gap, Extension gap, Technology index and yield

INTRODUCTION

India is the largest producer of pulses in the world, both in quantity and variety. Pulses are the primary source of protein for the poor and the vegetarians who constitute the majority of Indian population. While the traditional cropping pattern almost always included a pulse crop either as a mixed crop or in rotation, the commercialization of agriculture has encouraged the practice of sole-cropping. Pulses contribute 11 per cent of the total intake of proteins in India (Reddy, 2010). In India, frequency of pulses consumption is much higher than any other source of protein, which indicates the importance of pulses in their daily food habits. Keeping the cheapest source of protein, it is important to increase pulses production to increase balanced diet among the socially and economically backward classes. India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the

World. Although it is the world's largest pulses producer, India is importing 4-6 million tons (MT) and consumer (26-27 MT) of pulses every year to meet its domestic demand (DAC & FW, GOI 2018-19). India achieved a record 25.23 MT pulses production in 2017-18 with pigeon pea 21.10 per cent, chickpea 40.55 per cent, green gram 9.38 per cent, black gram 12.23 per cent and other pulses 16.77 per cent share in total production (Directorate of Economics and Statistics, DES 2017-18). Pulses are grown across the country with the highest share coming from Madhya Pradesh (23%), Uttar Pradesh (18%), Maharashtra (14%), Rajasthan (11%) and Andhra Pradesh (09%). In Burhanpur district area of pulses is 6.934 (000'ha) with a production of 8.7694 (000' tons) whereas productivity is 1048.40 (kg/ha). Keeping in view the importance of Pulses production technology the present study was conducted to establish the production potential of high yielding varieties of pulses by Technology Gap, Extension Gap, Technology Index and economic

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impact of pulses and comparing the yield level of FLDs plot with non FLD plots.

METHODOLOGY

The study was conducted by KVK, Burhanpur during 2013-14 to 2018-19 in adopted villages (Harda, Nimandar, Manjrod, Umarda, Sandas) of Krishi Vigyan Kendra, a total 100 front line demonstrations on pulses variety in adopted villages of Burhanpur district (Table 1). The component demonstration of front line technology in pulses was comprised of improved variety, proper seed rate, seed treatment, sowing method, nutrient management, proper irrigation, weed management, protection measures, harvesting and post-harvest management. The yield and economic performance of front line demonstrations, the data on output were collected from FLDs as well as local plots and finally the production, cultivation cost, gross return, net returns with the benefit cost ratio was worked out. The FLD was conducted to study the technology gap between the potential yield and demonstrated yield, extension gap between demonstrated yield and yield under existing practice and technology index.

The yield data were collected from both the demonstration and farmers practice by random crop cutting method and analyzed by using simple statistical tools. Site selection and farmers' selection were considered as suggested by Choudhary (1999). The observation on seed yield, straw yield per ha were recorded. Other parameters like harvest index, technology index were worked out as suggested by Kadian *et al.* (1997). The gross return, net return, cost of cultivation and benefit cost ratio were also calculated. Training to the farmers of respective villages was imparted before conducting the demonstrations with respect to envisaged technological.

Extension Gap (q/ha) = Demonstration Yield – Check Yield

Technology Gap (q/ha) = Potential Yield – Demonstration Yield

Technology Index (%) = Technology Gap / Potential Yield X 100

RESULTS AND DISCUSSION

Mean data of Table 2 indicated that potential yield of pulse crops was 18.40 q/ha followed by demonstration yield (15.74 q/ha) and farmer's yield (12.50 q/ha) whereas, additional yield over local check was 3.04 q/ha

Table 1: Year wise detail of front line demonstrations on pulses

Year	Crop	Variety	Village	Area (ha)	No. of FLDs
2013-2015	Black gram	JU-86	Harda	08	20
2014-2016	Soybean	RVS 2001-4	Nimandhar	08	20
2015-2017	Pigeon Pea	TJT-501	Manjrod	08	20
2016-2018	Chickpea	JAKI-9218	Umarda	08	20
2017-2019	Green Gram	TJM-3	Sandas	08	20
Total				40	100

Table 2: Yield performance of different pulses under demonstration (Pooled data)

Crop	Yield (q/ha)			Additional Yield over local check (q/ha)	Percent Increase Yield over local check (%)
	Potential Yield (PY)	Check Yield (FP)	Demo Yield (RP)		
Black Gram	10.00	06.50	07.80	1.30	20.00
Soybean	25.00	15.00	19.00	4.00	21.05
Pigeon Pea	24.00	20.00	22.00	2.00	10.00
Chickpea	21.00	13.00	19.88	6.88	34.61
Green Gram	12.00	08.99	10.00	1.01	11.23
Mean	18.40	12.50	15.74	3.04	19.38

and percent increase yield over local check is 19.38 per cent. This result clearly indicated that the higher average grain yield in demonstration plots over the years compared to farmer's practice was achieved due to knowledge and adoption of full package of practices i.e. appropriate variety, sowing time, seed rate, seed treatment, sowing method, spacing, weed management, irrigation practices and need based plant protection techniques. The findings are in similarity with the findings of Singh (2002); Poonia and Pithia (2011); Kumbhare *et al.* (2014); Nain *et al.* (2014); Dhaka *et al.* (2015) and Lal *et al.* (2016).

Mean data of Table 4 reveals that technological gap in pulses crop is 1.01 q/ha, extension gap is 3.04 q/ha. This may be due to the soil fertility, managerial skills of individual farmer's and climatic condition of the area. Hence, location specific recommendations are necessary to bridge these gaps. Technology index is 15.27 per cent which shows the effectiveness of technical interventions. This accelerates the adoption of demonstrated technical interventions to increase the yield performance of pulse crops. Similar findings were reported by Kirar *et al.* (2006); Meena *et al.* (2016) and Singh *et al.* (2014).

Mean data of Table 4 clearly shows Economics of FLD. Cost of cultivation of pulses in demo plot is 19360 Rs/ha and check plot is 17200 Rs/ha, Gross return is 65870 Rs/ha as compare to check plot 47090 Rs/ha, Net return 46510 Rs/ha as compare to check plot 29940 Rs/ha and B:C ratio is 3.09 and of 2.52 of check plot for Front line demonstrations. This may be due to higher yield obtained and lower cost of cultivation under improved technologies compared to local check (farmers practice). This finding is in corroboration with the findings of Mokidue *et al.* (2011); Verma *et al.* (2016) and Raj *et al.* (2013).

CONCLUSION

The study was under taken to ascertain the economics of pulses production technologies. Front line demonstration (FLDs) played a very important role to disseminate recommended technologies resulting in an increased in yield at farmers' level and proved the potential of technology. The result convincingly brought out that the yield of pulses can be increased with the intervention on recommended package of practices. This

Table 3: Technology gap, extension gap and technology index of pulses under FLD

Crop	Technology Gap (q/ha) TG = PY – RP	Extension Gap (q/ha) EG = RP – FP	Technology Index (%) TI = Tech. Gap/PY X 100
Black Gram	2.20	1.30	22.00
Soybean	6.00	4.00	24.00
Pigeon Pea	2.00	2.00	08.33
Chickpea	1.12	6.88	05.33
Green Gram	2.00	1.01	16.67
Mean	1.01	3.04	15.27

Table 4: Economic analysis of the demonstrated plot of pulses under FLDs (Pooled data)

Crop	Cost of Cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B : C Ratio	
	FP	RP	FP	RP	FP	RP	FP	RP
Black Gram	11500	12800	22750	27300	11500	14500	1.00	1.13
Soybean	23000	23000	52500	66500	29500	43500	2.29	2.89
Pigeon Pea	18000	22500	70700	106050	52700	83550	3.93	4.71
Chickpea	20000	23500	52000	79500	32000	56000	2.60	3.38
Green Gram	13500	15000	37500	50000	24000	35000	2.78	3.33
Mean	17200	19360	47090	65870	29940	46510	2.52	3.09

also improved linkages between farmers and scientists, and built confidence for adoption of the improved technology. Productivity enhancement under FLDs over farmer practices of pulses cultivation created a greater awareness, and motivated other farmers not growing pulses to adopt improved technologies. These practices may be popularized in this area by the extension agency to bridge the higher extension gaps.

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Utilization of Social Media by Farming Community: A Case from Punjab State

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ABSTRACT

To equip the farmers with recent technologies, and innovations various tools of cyber extension are being used by the farming community, social media is one such area. To understand the utilization pattern of these social media tools used by farmers for agriculture purpose the study was conducted in Punjab state with fifty respondents (farmers) selected by simple random sampling technique. The data were collected through survey method using structured interview schedule. Two third of the respondents (66%), used YouTube always for agriculture related information. Majority of the respondents (52%) used PAU Kisan App 'sometimes' whereas 34 percent used it 'always' for getting information regarding agriculture, majority (58%) of the farmers posted queries on social media platforms. 68 per cent of the farmers contribute to discussions held in social media. Two third of the respondents (66%) shared agriculture information further on social media. Most of the farmers (74%) said that social media fulfills their information needs. Majority used social media for seeking information related to agriculture such as new varieties, trainings etc. Hence, it can be concluded that social media can be a new age solution to cater to the challenge of less availability of extension personnel by complementing the personnel for quick and effective dissemination of agriculture related information ultimately empowering farming community.

Keywords: Agriculture information, Credibility, Farming community, Social media, Utilization

INTRODUCTION

As per changing needs of stakeholders, emergence of new school of thoughts and advancement in agriculture, paradigm shift has been witnessed through time in the extension approach. A modern approach of cyber extension has come up to cater to the most important issue in extension mechanism i.e. lack of technical human resource, credibility and infrastructural issues. It includes effective use of Information and Communication Technology, national and international information networks, internet, expert systems, multimedia learning systems and computer based training systems to improve information access to the farmers, extension workers, research scientists and extension managers (Anonymous, 2019). With this approach, the existing parity in

information between the various stakeholders can be reduced to an extent by complementing it with conventional extension system.

Agricultural information exchange has been dominated by industrial media such as newspapers, television and magazines. In recent years, however, technology awareness, computer literacy and usage of smart phones and internet are increasing across all demographics in India (Lathiya, 2015). Now, various tools of cyber extension are being used by the farming community. Low-cost information and communication technology tools possess the ability to deliver timely, relevant, and actionable information to farmers at lower costs than traditional extension services (Aker, 2011). With recent rapid developments in the mobile technology

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and good network facility, new ways of transfer of technology have emerged. Web based portals and mobile applications which are considered as social media or 'New Media', now being used in a greater extent. In the pioneering work related to social media by Kaplan and Haenlein (2009), the term is defined as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user-generated content. According to Bhattacharjee and Raj (2016), "Social media are web based tools of electronic communication that allows users to interact, create, share, retrieve, and exchange information and ideas in any form (text, pictures, video, *etc.*) that can be discussed upon, archived, and used by anyone in virtual communities and networks." Social media tools may include (but are not limited to): Social networking sites (e.g. Facebook), Video sharing websites (e.g. YouTube), and photo sharing websites (e.g. Instagram), Blogs, Microblogs (e.g. Twitter), forum discussion groups (e.g. Google Groups, Yahoo Groups), collaborative projects (e.g. Wikipedia), Video conferences and web conferences, Socially integrated mobile text messaging (e.g. WhatsApp), professional networking (e.g. LinkedIn) (Anonymous, 2013). The social media provides a platform for its users to actively participate in information seeking and sharing. Now, it becomes essential to understand the utilization pattern of this new media and how credible this new media is. Hence, the present study was conducted to fill the void.

METHODOLOGY

Descriptive research design was used for the study. Punjab state was taken as the universe. A total number of 50 respondents (farmers) were selected by simple random sampling technique. The independent variables taken for the study were age, education, marital status, family size, family type, operational land holding and annual income. The dependent variables were utilization of social media and credibility of social media. The data were collected through survey method using structured interview schedule. The credibility of social media tools among farmers were determined through six factors such as timeliness, factualness, usefulness, completeness, need based and problem solving. The data was analyzed using weighted mean, frequency, percentage and correlation

coefficient. In order to find the factors related to utilization of social media for agriculture among the respondents, a correlation analysis was done using statistical package for social sciences (SPSS).

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

The information regarding socio-economic characteristics of the farmers has been presented in Table 1. The data revealed that majority of the respondents i.e.

Table 1: Distribution of the respondents on the basis of socio-economic characteristics (n=50)

Category	Freq.	Percentage
Age		
Young (22-39)	17	34
Middle (40-57)	21	42
Old (58-74)	12	24
Education		
Illiterate	0	0
Secondary education	6	12
Matric	13	26
10+2	9	18
Graduate	15	30
Post graduate and above	7	14
Marital status		
Unmarried	7	14
Married	43	86
Divorced/ separated	0	0
Widow	0	0
Family size		
Small (up to 8)	44	88
Medium (8-12)	4	8
Large (above 12)	2	4
Family type		
Nuclear	34	68
Joint	16	32
Operational land holding (Acre)		
Marginal (<2.5)	1	2
Small (2.5-5)	4	8
Semi medium (5-10)	6	12
Medium (10-25)	19	38
Large (>25)	20	40
Annual income (Rs.)		
<Rs. 2,50,000	10	20
Between Rs. 2,50,000-Rs.5,00,000	8	16
Between Rs. 5,00,000-Rs. 10,00,000	19	38
More than Rs. 10,00,000	13	26

42 per cent were found to be aged from 40 to 57, maximum percentage of the respondent (30%) had studied up to graduation, married (86%), majority (88%) had size of family from 3 to 8. More than two third of the respondent (68%) belonged to nuclear family, 40% had large (>25 acre) land holding. Regarding annual income of the respondents, majority (38%) of the farmers had medium annual income between 5-10 lakhs.

Utilization of social media

The data regarding the utilization of social media is given in the following Table 2. It was taken in terms of ranking according to the weighted mean score of obtained frequency for each of the social media tool.

The data revealed that majority (50%) of the respondents were using Facebook daily. 38 per cent were using this application monthly. Twitter was not used by most of the farmers (88%). WhatsApp was being used by 82 per cent of the respondents daily and weekly by 8

per cent of respondents. Majority of the respondents (78%) were found to be using YouTube daily and 40 percent of them were using the application monthly. PAU Kisan App was used monthly by majority (40%) of the farmers, 34 per cent of the farmers were using this app daily. Majority of the respondents (78%) had never used Instagram and 92 per cent of the respondents had never used LinkedIn application. One respondent was using Plantix application.

The usage of social media tools for agricultural purpose by the farmers is compiled into Table 3. It was taken in terms of ranking according to the weighted mean score of obtained frequency for each of the social media tool. Regarding utilization of social media for agriculture, nearly half of the respondents (48%) used Facebook sometimes for agriculture purpose followed by 36 per cent who used this application always, 16 per cent respondents never used Facebook for agriculture purpose. Twitter was never used by majority of the

Table 2: Distribution of the respondents on the basis of utilization of social media (n=50)

Social Media	Daily		Weekly		Monthly		Never		Weighted Mean Score	Rank
	f	%	f	%	f	%	f	%		
Facebook	25	50	2	4	19	38	4	8	1.96	III
Twitter	3	6	2	4	1	2	44	88	0.28	VI
WhatsApp	41	82	4	8	2	4	3	6	2.66	II
YouTube	39	78	3	6	7	14	1	2	2.86	I
PAU Kisan App	17	34	6	12	20	40	7	14	1.66	IV
Instagram	8	16	2	4	1	2	39	78	0.58	V
LinkedIn	0	0	1	2	1	2	46	92	0.06	VII
Others (Plantix)	0	0	1	2	0	0	49	98	0.04	VIII

Table 3: Utilization of social media for agriculture

Social Media	Always		Sometimes		Never		Weighted Mean score	Rank
	f	%	f	%	f	%		
Facebook	18	36	24	48	8	16	1.2	III
Twitter	0	0	2	4	48	96	0.04	V
WhatsApp	35	70	10	20	5	10	1.6	I
YouTube	33	66	11	22	6	12	1.54	II
PAU Kisan App	17	34	26	52	7	14	1.2	III
Instagram	1	2	2	4	47	94	0.08	IV
LinkedIn	0	0	0	0	50	100	0	VII
Others (Plantix)	0	0	1	2	0	0	0.02	VI

respondents (96%) for taking agriculture related information; only 4 per cent respondents used it sometimes. WhatsApp was the most used social media tool by the farmers as majority (70%) of them used it always; followed by 20 per cent who used it sometimes, 10 per cent farmers never used this application. Two third of the respondents (66%), used YouTube always for agriculture related information followed by, 22 percent who used it sometimes making it the second most used application for agriculture related information. Majority of the respondents (52%) used PAU Kisan App 'sometimes' whereas 34 per cent used it 'always' for getting information regarding agriculture, 7 per cent of the respondents never used this application and it was the third most used application by the farmers. Only two percent of the respondents had taken agriculture related information through Instagram always, four percent took the information sometimes through Instagram and rest 94 per cent farmers never took agriculture information through Instagram. LinkedIn was not used by any of the respondent for agriculture information.

Activities and purpose served on social media

The data on the activities generally performed by the farmers with the use of different social media tools is depicted in Table 4. It can be observed that majority (58%) of the farmers post queries on social media platforms whereas 38 per cent farmers do not post queries. 68 per cent of the farmers contribute to discussions held in social media. Two third of the respondents (66%) shared agriculture information further on social media. Most of the farmers (74%) said that social media fulfills their information needs. 72 per cent of the respondents did not prefer social media over other channels and rest 28

per cent of the respondents preferred social media. Similar activities were reported by farmers on WhatsApp messenger by Nain *et al.* (2019).

The data regarding purpose of using social media by the farmers is given in the Table 5. It is taken as the ranking according to the weighted mean score of obtained frequency for each parameter. From the table, it is seen that information seeking was given rank one by the respondents, networking with fellow farmers was ranked two and sharing the information further with others was ranked third. Similarly, for the solution of farm related problem, selling or buying of agricultural commodity, to know the market rates and for branding of agricultural commodity were ranked fourth, fifth, sixth and seventh respectively.

The data regarding credibility of social media tools as perceived by the farmers is given in the Table 6. All four social media tool was given the ranking for each of the six factors of credibility individually and their weighted mean were calculated. For timeliness factor WhatsApp was given first rank followed by YouTube and Facebook.

Table 5: Purpose of using social media as identified by the respondents (n=50)

Purpose	Weighted Mean score	Rank
Information seeking	6.55	I
Sharing information	5.17	III
Selling / buying of agri-commodity	3.17	V
Solution of problem	3.62	IV
Market rates	2.62	VI
Branding of agri-commodity	1.31	VII
Networking with fellow farmers	5.53	II

Table 4: Respondents' activities on social media

Activities	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Post queries on social media platforms	29	58	19	38
Contribute to discussions on social media	34	68	16	32
Share agricultural information on social media	33	66	17	34
Social media fulfills information needs	37	74	13	26
Prefer obtaining your agricultural information from social media over other channels?	14	28	36	72

Table 6: Credibility of social media tools identified by the respondents (n=50)

	Timeliness Mean score	Factualness Mean score	Usefulness Mean score	Completeness Mean score	Need based Mean score	Problem solving Mean score	Overall Mean score
Facebook	1.44	1.56	1.8	1.9	1.72	1.7	1.687 (IV)
WhatsApp	2.18	2.2	1.92	1.7	2.14	1.8	1.995 (II)
YouTube	1.86	1.91	2.19	2.15	1.8	2.21	2.02 (I)
PAU Kisan App	1.00	2.25	2.15	2.21	2.01	2.01	1.938 (III)

The queries regarding several issues asked by the farmers are promptly answered by the scientists or experts through WhatsApp. For factualness, PAU Kisan App was ranked first followed by WhatsApp and Facebook. The PAU App gave authentic information as compared to other media tools. YouTube was ranked one by the farmers on usefulness followed by PAU Kisan App and WhatsApp. The variety of information provided in the form of visuals in YouTube helping in the solution of different farm related issues and providing them with new information is the reason it is perceived as more useful. Regarding completeness of information PAU Kisan App was given the first rank followed by YouTube and Facebook. The PAU Kisan App provides a complete research based information to the farmers. WhatsApp was ranked first for providing need-based information followed by PAU Kisan App and YouTube. WhatsApp helps in providing location specific solution to the farmers through direct message facility including various media such as audio, video, images etc. at any time. Regarding solving of a particular problem, YouTube was ranked first followed by PAU Kisan App and WhatsApp. The YouTube app provides audio and visual together which provides more clarity of the solution of the issue. From the overall mean score, YouTube was found to be the most credible source among all social media tools with the mean score 2.02. All the new information is taken from the YouTube and it is considered useful and problem solving by most of the farmers. WhatsApp was considered as second most credible social media tools by the farmers as it gives need based and timely information to them. PAU Kisan App and Facebook was given third and fourth rank respectively.

A cursory look at the correlation results revealed (Table 7) that out of the independent variables, land holding

Table 7: Correlation coefficients of utilization of social media for agriculture

Independent variable	Correlation coefficient (‘r’ value)	‘p’ value
Age	-0.377	0.007**
Education	0.428	0.002**
Land holding	-0.0515	0.722
Income	-0.0194	0.894

**Significant at 1% and 5% level of significance

and annual income of the household were not associated with the utilization of social media for agriculture but age and education were significantly related with the utilization. The value of correlation coefficient between age and utilization was -0.377 and the p-value was 0.007 which was lesser than $p=0.01$. Hence it can be concluded that there was a significant negative relationship between the two variables. Similarly, the value of correlation coefficient between education was 0.428 and the p-value was 0.002, hence, it can be said that education had significant positive relation with the utilization of social media for agriculture. It can be inferred that higher education facilitates taking information through internet sources. Further, aged people prefer traditional sources of information whereas young and middle aged has higher interest for active involving on social media for information seeking and sharing.

CONCLUSION

Majority of the respondents were using Facebook, YouTube and WhatsApp daily and PAU Kisan App monthly. These channels can be used as the quick dissemination tool for creating awareness about innovations to the farming community. Regarding utilization of social media for agriculture, WhatsApp and

YouTube was used always by majority of the respondents. It becomes imperative that each and every department in research and extension institutions should make a social media group. An effort should be made to connect the experts of the department with farmers on the single media platform. The farmers generally use social media for seeking and sharing information among fellow farmers, and networking with peer group. To facilitate the building relationship and hassle free personal contacts and to integrate the research-extension-farmer linkages further through social media, a framework for capacity building for all related stakeholders can be made. Young and middle aged actively involve on social media as compared to older people. A communication strategy should be formulated to connect these individuals to gain insights from their life experiences. A social media platform for such type of localized information and more penetration among the farming community can be made. The government should promote information and media literacy with the advancements in the education system. Farmers perceived YouTube as the most credible source of information among all social media tools. Media richness of YouTube is also high. Hence, new projects related to generating media packages with more emphasis on videos can be initiated according to the need and interest of the farmers.

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Analysis of YouTube Use Pattern among Farmers for Agro-advisory

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ABSTRACT

YouTube is the most popular social media platform for young farmers and agricultural professionals for seeking information related to agricultural innovations, upcoming technologies and specialized skills, as evident from number of videos uploaded by different users. YouTube is the 2nd largest search engine and 3rd most visited site on the web. Almost 94 per cent farmers use mobile phone, especially in developed countries. Farmers are more likely to be found on YouTube in the early morning hours or evening. KVK, Solapur designed and developed YouTube channel by the name “LRT Farm Advise” on March, 21 2015. Developed 3-5 minutes videos as per the demand of farming community based on problem and uploaded it. The short videos of production, protection and innovations were uploaded, out of that five point technology of Red gram production got highest response. The majority (95.10%) YouTube subscribers belong to young (25 to 34 years) category. It was observed that 2,362 viewers seen the videos more than 3633 minutes within last 28 days. Also more than 5,25,600 minutes view time since first upload. It is inferred that YouTube channel helps to improve knowledge of farming, enhance adoption of innovation & improved technologies helps to increase productivity and farm income.

Keywords: Advisory, Social media, Subscribers, Views, Watch time, YouTube

INTRODUCTION

Accessibility of social media through mobile phones and the scope of mass-personal and mass-self communication makes it a popular platform among the masses to share idea and increase likability and content sharing across the multiple platforms. On an average public extension services only reach 6.8 per cent of farmers (NSSO, 2014) has indicated that of the 40.6 per cent households who received extension assistance, only 11 per cent of the services came from physical government machinery extension agent, KVK's and agricultural universities. This gap needs to address through exploring the other options like Information and Communication Technologies. The potential of social media channels like WhatsApp Face book, and YouTube among others are not yet fully exploited by agricultural

extension and development departments to reach to unreached (Nain *et al.*, 2019), although more than 5.6 billion people (nearly 80% of world population) use mobile phone. Also, lack of awareness and skills to use of social media like YouTube have been considered as major reason behind minimal use of social media by the farmer (Saravanan and Bhattacharjee, 2014). These constraints can be addressed by creating awareness and training about social media like YouTube. The studies have focused on use of YouTube especially by the young farmers for delivering innovations and improved technologies for better adoption.

METHODOLOGY

Present study is an online exploratory study assessing the use of YouTube channel designed and developed by KVK, Solapur by the name “LRT Farm Advise” during

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March, 21, 2015. The KVK, Solapur developed 3-5 minutes videos as per the demand of farming community based on problem and uploaded it. The short videos of production, protection and innovations were uploaded. Use of YouTube channel as a popular social media platform was studied over one year through the YouTube App and analyzed the data and drawn inferences.

RESULT AND DISCUSSION

The results along with relevant discussion have been presented in prime heads as personal attributes of users, top videos watch time, subscriber watch time, output of YouTube channel & beneficiaries and challenges of YouTube users.

The personal attributes which were assumed to influence the use of YouTube channel have been included and presented in Table 1. The data shows that majority YouTube users (95.10%) belonged to the young category (25 to 34 years) followed by 4.90 per cent only, middle age group (35 to 44 years) respectively. In nut shell all the YouTube users were in productive age group. Also the majority YouTube channel users were male category and from India.

Table 1: Personnel attribute of the farmers (n=200)

Variables	Category	Percentage
Age	Young (25 to 34 years)	95.10
	Middle Age (35 to 44 years)	4.90
Gender	Male	99.00
	Female	1.00
Country	India	90.10
	Other countries	9.90

Agricultural videos plays vital role for improving skill and knowledge of the farmers. Data pertaining to watch time of top videos presented in Table 2 reveals that the video on Five Point Technology of Red gram Production was watched more than 3423 minutes during last 28 days followed by Innovative Drum Roll Method of Onion Cultivation (123 Minutes), Drumstick Production (116 Minutes) and How to Minimize loss of Soybean (39 Minutes). The possible reason for watching Red gram video more time might be more number of Red gram growers and need of standing crops.

Table 2: The details of the top videos watched by the farmers (Last 28 days)

Title of video	Watch time (Min.)
Innovative drum roll method of onion cultivation	123
How to minimize the loss of soybean	39
Five point technology of red gram production	3423
Drumstick production	116

The details of subscribes, watch time and output of YouTube channels are given in Table 3 & 4.

Evident from Table 3, majority (91.30%) videos has been watched by non subscribers followed by subscribers (6.50%) and 2.1 per cent watch time of unknown viewers. Also the data from Table 4 reveals that during last 28 days more than 3633 minutes different videos have been watched with 2362 views and increased 42 subscribers. Also more than 5,25,600 minutes view time since first upload. This indicates that YouTube channel “LRT Farm Advise” has become popular tool to seek improved agricultural technology and innovation based information as well.

Table 3: Details of subscribers-wise watch time (Last 28 days)

Viewers	Watch Time (%)
Not Subscribed	91.30
Subscribed	6.5
Unknown	2.1

Table 4: YouTube channel output (Last 28 days)

Parameter	Unit
Watch time	3,633 Minutes
Views	2,362 Numbers
Subscribers	42 Numbers

Expressed challenges of YouTube users

Mobile phone users are increasing day by day, but data charges are higher hence internet is inaccessible to many rural youth. Load shading of electricity in rural areas, lack of internet connectivity for using social media was reported another issue in order. At rural level, illiteracy is still one of the biggest challenges holding back the development efforts especially to old aged farmers

limiting their skill in use. Most disadvantaged groups in the rural areas were reported to be the women and their restricted use of mobile phone and finally it was observed that most users were very passive and only few were proactive. While many visit YouTube, only few gave feedback, share and discuss ideas.

CONCLUSION

YouTube is the 2nd largest search engine and 3rd most visited site on the web. More than 5.6 billion of people use mobile phone, nearly 80 per cent of world population. Almost 94 per cent farmers use mobile phone. KVK, Solapur designed and developed YouTube Channel by the name: LRT Farm Advise” during the March, 21, 2015. The Senior Scientist & Head of KVK developed 3-5 minutes videos as per the demand of farmers based on problems and uploaded it. The majority subscribers / viewers are young and from India and most watched video was Five Point Technology of Red gram Production. Total 2362 viewers watched the videos more than 3633 minutes during the last 28 days. Also more than 5,25,600 minutes view time since first upload. YouTube channel helps to improve knowledge of farming and improved production technologies which helps to improve productivity and income of farmers. Also application of technologies & innovations.

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Extent of Adoption of Castor Production Technology by FLD and Non-FLD Farmers in Banaskantha District of Gujarat State

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ABSTRACT

The study was conducted in three talukas (Dantiwada, Vadgam and Dhanera) of Banaskantha District. All the nine villages in which frontline demonstrations on castor crop were conducted by KVK, Deesa were selected and a total of 150 respondents were selected for the study. The result revealed that nearly three-fifth (57.33%) of FLD respondents were in medium randomly category of adoption of castor production technology. Whereas 22.67 per cent had high and 20.00 per cent had low extent of adoption. In case of Non-FLD farmers, majority had medium extent of adoption of castor production technology, whereas, 30.67 per cent had low and 13.33 per cent had high level of adoption.

Keywords: Castor growers, Extent of adoption, FLD, Non-FLD, Castor production technology

INTRODUCTION

Castor is an important industrial non-edible oilseed crop. The Gujarat state ranks first in the country with respect to area, production and productivity among all major castor growing states in the country. The lack of transfer of technology from research system to the client system is the main problem in increasing agricultural production in the developing world. The present rate of agricultural production can be doubled if the available castor production technologies are brought to bear with production process and programme. This requires the steady flow of information from the scientist to the farmers. This is possible through the demonstration as it is an important and appropriate extension method which makes it possible to disseminate technology to the user farmers. Keeping this fact in view, the Government of India launched frontline demonstration programmes for increasing crops production. It has played significant role in increasing the knowledge, adoption and yield of recommended castor production technologies by the castor growers.

METHODOLOGY

The study was conducted in Banaskantha District of Gujarat state as it ranks first in the state in area under castor cultivation. Three talukas viz., Dantiwada, Vadgam and Dhanera were selected for present investigation due to greater number of FLDs on castor crop were conducted in these three talukas by KVK, Deesa. All the nine villages in which frontline demonstrations on castor crop were conducted by KVK, Deesa were selected. A comprehensive list of FLD farmers was collected from the KVK, Deesa. Using proportionate random sampling method, 75 per cents FLD farmers were selected randomly and equal numbers of Non FLD farmers were also selected randomly from same villages. Thus, total 150 respondents were selected for the study. *Ex-post facto* research design was used for the study.

RESULT AND DISCUSSION

The data in Table 1 reveal that nearly three-fifth (57.33 per cent) of FLD respondents were found in

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Table 1: Extent of adoption of castor production technology

S.No.	Extent of Adoption	Category			
		FLD farmers (n=75)		Non-FLD farmers (n=75)	
		Frequency	Per cent	Frequency	Per cent
1.	Low level Adoption ≤ Mean – S.D.	15 (Below 8.44)	20.00	23 (Below 7.20)	30.67
2.	Medium level Adoption Mean ± S.D.	43 (8.44 to 10.74)	57.33	42 (7.20 to 10.24)	56.00
3.	High level Adoption ≥ Mean + S.D.	17 (Above 10.74)	22.67	10 (Above 10.24)	13.33
	Total	75	100	75	100
	Mean		9.59		8.72
	S.D.		1.15		1.52
	‘Z’ value		3.919**		

medium category of adoption of castor production technology whereas 22.67 per cent had high and 20.00 per cent had low extent of adoption. In case of Non-FLD farmers, above half (56.00%) had medium adoption of castor production technology whereas, 30.67 per cent had low and 13.33 per cent had high level of adoption. The analysis of data showed that great majority of FLD respondents (80.00%) had medium to high and Non FLD respondents (86.67 per cent) of castor growers had medium to low level of adoption of castor production technology. It is evident that ‘Z’ value (3.919) was found to be highly significant, which indicate that FLD castor growers had significantly higher adoption of castor

production technology than Non FLD castor growers. The probable reason for having highly significant difference may be due to medium level of knowledge and moderately favourable attitude possessed by most of the FLD respondents. Another reason might be due to sincere efforts put forth by implementing agencies Krishi Vigyan Kendras to communicate the castor production technology to FLD respondents of North Gujarat.

The information regarding practice-wise adoption of castor production technologies is furnished in Table 2 and reveals that in case of FLD farmers, practices-wise adoption in descending order were; plant protection

Table 2: Practices-wise adoption of castor production technology

S.No.	Name of Practices	Category of Respondents					
		FLD farmers (n=75)			Non FLD farmers (n=75)		
		Frequency	Percent	Rank	Frequency	Percent	Rank
1.	Varieties grown	60	80.00	IV	54	72.00	VI
2.	Seed rate	55	74.33	VI	51	68.00	VIII
3.	Time of sowing	59	78.67	V	62	82.67	II
4.	Seed treatment	62	82.67	III	52	69.33	VII
5.	Spacing	54	72.00	VII	42	55.67	XI
6.	Farm Yard Manure	52	69.33	VIII	47	62.67	IX
7.	Chemical Fertilizer	65	86.33	II	60	79.67	III
8.	Total number of irrigations	42	56.00	XI	57	75.67	V
9.	Weeding and inter-culturing	50	66.66	IX	45	59.89	X
10.	Use of weedicides	46	61.33	X	57	76.00	IV
11.	Plant protection measures	67	89.00	I	63	84.00	I

Table 3: Association between extent of adoption of the respondents and their personal profile

S.No.	Personal profile	r-Value	
		FLD farmers (n= 75)	Non-FLD farmers (n= 75)
1.	Age	-0.0823 ^{NS}	0.0494 ^{NS}
2.	Education	0.2776*	0.1846 ^{NS}
3.	Annual income	0.0884 ^{NS}	0.0154 ^{NS}
4.	land holding	0.2345*	0.2160 ^{NS}
5.	Social participation	0.2498*	0.2382*
6.	Extension participation	0.2460*	0.2544*
7.	Sources of Information	0.2463*	0.1364 ^{NS}
8.	Economic Motivation	0.2930*	0.1680 ^{NS}
9.	Risk orientation	0.2350*	0.1995 ^{NS}

measures (89.00%), chemical fertilizer (86.33%), seed treatment (82.67%), varieties grown (80.00%), time of sowing (78.67%), spacing (72.00%), farm yard manure (69.33%), weeding and inter-culturing (66.66%), use of weedicides (61.33%) and total number of irrigations (56.00%). In case of Non FLD farmers, practices-wise adoption in descending order were; Plant protection measures (84.00%), time of sowing (82.67%), chemical fertilizer (79.67%), use of weedicides/ herbicides (76.00%), total number of irrigations (75.67%), varieties grown (72.00%), seed treatment (69.33%), seed rate (68.00%), farm yard manure (62.67%), weeding and inter-culturing (59.89%) and spacing (55.67%).

The data in Table 3 reveal that in case of FLD respondents, out of the nine independent variables, education, land holding, social participation, extension participation, sources of information, economic motivation

and risk orientation had positive and significant association with extent of adoption of castor production technology. Annual income had positive but not significant correlation with extent of adoption of castor production technology and age had negative and not significant correlation with extent of adoption of castor production technology.

While, in case of Non-FLD respondents, social participation and extension participation had positive and significant correlation with extent of adoption of castor production technology. Age, education, annual income, land holding, sources of information, economic motivation and risk orientation had positive and not significant correlation with extent of adoption of castor production technology. Similar results were reported by earlier researchers like Bhoi (2008); Chanu *et al* (2014) and Shrma (2015).

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Factors Influencing the Prospects of Zero Till Technology in Punjab

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ABSTRACT

The zero-tillage technology is widely maintained as an integrated approach to conserve resources that can tackle the problem of wheat yield stagnation in the rice-wheat zone by improving planting time, reducing weed infestation, and enhancing fertilizer and water use efficiency. An attempt was made to assess the factors influencing the prospects of zero till technology in Punjab. A sample of 50 adopter farmers was selected by following cluster sampling design from Faridkot, Fazilka, Ferozepur, Gurdaspur, Hoshiarpur, Ludhiana, Mansa and Sangrur districts of Punjab state. The findings revealed that more than half (56.00%) of the farmers wanted to discontinue zero till drill in coming years. About one fourth (24.00%) of the farmers were willing to keep area constant under zero till drill. Majority of the farmers (68.00%) indicated to have favourable attitude towards zero till drill. Regarding functioning of zero till drill, it can only be used after straw removal (28.00%). Functioning of zero till drill also affected by stubbles (16.00%) as it needs fields to be cleaned properly. Determinants significantly influencing the prospects of zero till technology were age, operational land holding, family type, innovativeness, risk orientation and economic motivation of farmers.

Keywords: Attitude, Impact, Problems, Prospects, Resource conservation technology, Zero till drill

INTRODUCTION

Achieving food security on the rise of population and alleviating poverty under the current scenario of depleting natural resources, spiralling cost of inputs and explosive food prices are the major challenges before Indian agriculture. Intensive farming can be a way to overcome these challenges. Intensive farming is a method that uses higher inputs and advanced agricultural techniques to increase the overall yield. Sustainable intensive crop production system is difficult to be achieved with traditional crop production practices. However, conservation agriculture has risen as a route in this regard. Some of the main features of conservation agriculture are minimal tillage, ensuring soil nutrients and moisture conservation through crop residues and growth of cover crops and adoption of spatial and temporal crop sequencing (Bhan and Behera, 2014). The achievements

in resource conservation technologies have been possible with the continuous invasion of technologies like zero tillage, bed planting, residue retention and management, brown manuring, nitrogen management through use of leaf colour chart, direct seeded rice, surface seeding etc. Precision conservation agricultural practices (PCAP) is profitable and can help bridge the yield gap; increase incomes as well facilitate the capacity of smallholder farming households to adapt and mitigate climate change also the need for extension strategies and support cannot be undermined (Shitu *et al.*, 2018) The adoption of resource conservation technologies is expected to yield benefits to the farmers in terms of reduced losses due to soil erosion, saving of energy and irrigation costs, savings on labour, increased productivity and water-use efficiency, reduced pumping of groundwater, increased nutrient-use efficiency and adoption of new crop rotations. In the conventional method of wheat sowing, rice stubbles

are burned by most of the farmers, due to short window period between harvesting of rice and sowing of wheat. It leads to environmental pollution. The conventional tillage practices after rice harvest also involve extensive ploughing with common cultivator or deep tillage implements for preparation of a fine seedbed for wheat planting which is time consuming as well as costly. In order to save sowing time and the tillage cost, a new seed drill was introduced in the early 1980s that made it possible to sow wheat in freshly harvested and untilled paddy fields utilizing residual moisture. The drill named as zero-tillage drill and the method of wheat sowing with this drill is called as zero-tillage technology (Ali and Erenstein, 2013; Tripathi, 2014). Zero tillage is defined as planting crops in previously unprepared soil by opening narrow slots or trenches of the smallest width and depth needed for proper coverage of the seed. At least 32 per cent of the soil surface remains covered with crop residue. Zero tillage is, in a way, a complete farm management system that should include many agricultural practices including planting, plant residue management, weed and pest control, harvesting and crop rotations (Kumar *et al.*, 2010). The zero-tillage technology is widely maintained as an integrated approach to conserve resources that can tackle the problem of wheat yield stagnation in the rice-wheat zone by improving planting time, reducing weed infestation, and enhancing fertilizer and water use efficiency.

METHODOLOGY

The present study was conducted in Punjab state of India. For the selection of respondents two stage cluster sampling design was used. Twelve clusters were identified with the help of procured data from the concerned departments/ agencies at the first stage. Out of these identified clusters, four clusters were selected randomly for the study. These selected clusters were spread over Faridkot, Fazilka, Ferozepur, Gurdaspur, Hoshiarpur, Ludhiana, Mansa and Sangrur districts of Punjab. At the second stage of sampling design, 50 adopters were selected using probability proportional to number of farmers in each cluster. Thus, the total sample comprised of 50 adopter farmers. In the present study, the prospects of zero till drill was operationalized in terms

of attitude of farmers towards zero till technology and willingness of farmers to increase/decrease/discontinuance/keep the area constant under zero till drill in the coming years. Attitude of farmers toward zero till drill was measured by developing attitude scales based on Likert's method of scale construction. Attitude in this study was operationalized as the predisposition of the farmers towards zero till drill. Attitude score was calculated for each respondent. The mean $\pm$ SD method of classification was used to classify the score into four categories i.e. strongly favourable (>4.02), favourable (3.58-4.02), unfavourable (3.14-3.58) and strongly unfavourable (<3.14). Problems were analyzed through open-ended questions. To study the factors which affect prospects of zero till drill, ordinal regression analysis was used. Ordinal regression analysis is an extension of the general linear model to ordinal categorical data. The ordinal logistic model for i independent variables is:

$$\ln(\theta_i) = \alpha_i - \beta X$$

Where, $\theta = p/q$

$i = 1$ to (number of categories-1)

p = probability of score i

q = probability score greater than i

Scoring was given to dependent variable (prospects) as it was at ordinal level of measurement and it was also a prerequisite to conduct ordinal regression analysis. For response "increase in area", 4 score was assigned. Similarly, 3 score for "keep the area constant", 2 score for "decrease in area" and 1 score for discontinuance of zero till drill. The primary data were collected with help of interview schedule by personal interview method for the crop year 2018-19. After completion of data collection process, collected data were further entered, classified and analyzed on computer based spreadsheet software in order to reach on final results, discussion and conclusion.

RESULTS AND DISCUSSION

Social Personal Characteristics

It relates to the information regarding socio-personal characteristics of the respondents which included age, education, operational land holding, family type,

innovativeness, risk orientation and economic motivation. The information relating to the profile of the respondents has been given in Table 1. The results indicate that age of the respondents varied from 22-73 years. About half of the respondents (48.00%) belonged to the age group 22-41 years followed by 42.00 per cent falling in the category of 41-59 years. Rest of the respondents (10.00%) were in the age group of 59-73. It is assumed that educational background of the respondents play a significant role in adoption. It is evident that about one third (34.00%) of respondents were graduated followed by 30.00 per cent who had gained education upto matriculation level and 28.00 per cent were upto senior secondary level. More than half (54.00%) of the respondents had large (more than 10 ha) operational land holdings, followed by 24.00 per cent having medium (4-10 ha) operational holdings and 22.00 per cent respondents had semi-medium (2-4 ha) operational

holding. A large majority of the respondents with more than four hectare of landholding indicates that zero till technology is still restricted to large farmers only. More than half (58.00%) of the respondents had joint family and rest of the families (42.00%) were nuclear. About equal proportion of nuclear and joint family system showed the shift of family composition from joint to the nuclear system in Punjab. About two third (62.00%) of the respondents had high degree of innovativeness whereas less than one third of the respondents (32.00%) had medium degree of innovativeness. Only six per cent of the respondents had low degree of innovativeness. The results are in line with Singh (2011a) and Singh (2011b). Risk orientation is an important characteristic of the respondents belonging to different adopters' categories. It is the strength of the individual to take risk in adopting a new technology. Data indicate that 40.00 per cent of the respondents had medium level of risk orientation while 30.00 per cent of the respondents were both at low and high level of risk orientation. These findings are complimentary to those reported by Tiwari (2008) and Singh (2011a). A large majority of the respondents (96.00%) were having high economic motivation whereas only four per cent of the respondents were in medium level of economic motivation.

Table 1: Distribution of respondents on the basis of their social personal characteristics (n=50)

Social Personal Characteristics	Category/Range	Freq- uency	Perce- ntage
Age	22-41	24	48.00
	41-59	21	42.00
	59-73	5	10.00
Education	Primary	2	4.00
	Matric	15	30.00
	Senior Secondary	14	28.00
	Graduate	17	34.00
	Post graduate	2	4.00
Operational land holding (ha)	Semi medium (2-4)	11	22.00
	Medium (4-10)	12	24.00
	Large (>10)	27	54.00
Family type	Joint	29	58.00
	Nuclear	21	42.00
Innovativeness	Low (1-1.6)	3	6.00
	Medium (1.7-2.3)	16	32.00
	High (2.3-3)	31	62.00
Risk orientation	Low (1-1.6)	15	30.00
	Medium (1.7-2.3)	20	40.00
	High (2.3-3)	15	30.00
Economic motivation	Medium (1.7-2.3)	2	4.00
	High (2.3-3)	48	96.00

Prospects of zero till drill

A prospect is a way of looking ahead and expecting good things. According to the Collins dictionary, "a particular prospect is something that you expect or know is going to happen." "Prospect is a mental picture of something to come, the act of looking forward" as defined by Webster dictionary. Oxford dictionary define prospect as "a mental picture of a future or anticipated event." Prospects of zero till drill were presented in Table 2 and 3. A critical look at the figures presented in Table 2 reveal that majority of the respondents (68.00%) indicated to have favourable attitude towards zero till drill. However, 20.00 per cent of the respondents showed unfavourable attitude. A small proportion of the respondents expressed strongly unfavourable (10.00%) and strongly favourable (2.00%) attitude towards zero till drill, respectively. These findings are in accordance to those reported by Kumar *et al.* (2008), Tripathi *et al.* (2013) and Tiwari (2008)

Table 2: Distribution of respondents on the basis of attitude towards zero till drill (n=50)

Attitude	Frequency	Percentage
Strongly Favourable	1	2.00
Favourable	34	68.00
Unfavourable	10	20.00
Strongly Unfavourable	5	10.00

whereas these results are not in conformity with Cummins (2002). Favourable attitude towards zero till drill was due to the reason that this technology saves sowing time of wheat crop and it also facilitate farmers to sow wheat in freshly harvested and untilled paddy fields utilizing residual moisture. Further, zero till technology increases overall profit by eliminating input costs. From the above findings, it can be concluded that there was a positive prospects of zero till drill as majority of the farmers expressed favourable attitude.

An overview of the data presented in Table 3 show that more than half (56.00%) of the respondents wanted to discontinue zero till drill in coming years. The major reason behind this was adoption of its parallel technology i.e. happy seeder (HS) by majority of the respondents (82.14%) for wheat sowing and also there was reduction in yield (10.71%) of wheat crop. These results are in conformity to those reported by Kaur (2016b). On the

other hand, about one fourth (24.00%) of the respondents willing to keep area constant due to the reason that adoption was already on their maximum land holding (50.00%) and they were satisfied with current adoption (50.00%). The results are in disagreement to those reported by Kurnar *et al.* (2017) and Tiwari *et al.* (2008). A small proportion of the respondents (12.00%) wanted to increase the area from 20.5 acres to 25.83 acres (percent change; 26.00%) under wheat crop sown by zero till drill. Eight per cent of the respondents wanted to continue zero tillage technology on 45.00 per cent less area i.e. from 22.5 acres to 12.5 acres. The results are in contradictory to Tripathi *et al.* (2013).

Problems faced by the respondents in adoption of zero till drill

Data in Table 4 depict problems which were faced by the adopter farmers in adoption of zero till technology. The major problem in this regard was in functioning of the machine as zero till drill can only be used after straw removal (28.00%), as such no economic method was available in management of loose straw. Rodents were second major problem (20.00%) in zero till drill sown wheat crop. Further the functioning of zero till drill also affected by stubbles (16.00%) as it needs fields to be cleaned properly. A small proportion (4.00%) of the farmers reported that the machine cannot run in high

Table 3: Distribution of respondents on the basis of prospects of zero till drill (n=50)

Prospects	%	Area 1	Area 2	Per cent Change	Reasons	f*	%
Increase	12.00	20.50	25.83	26.00	Zero till drill is better than conventional/HS	5	83.33
					Increase in yield	1	16.67
					decrease in expenditure	4	66.67
Constant	24.00	14.50	14.50	NA	Already on maximum area	6	50.00
					Satisfied with current adoption	6	50.00
Decrease	8.00	22.50	12.50	45.00	Shifted to happy seeder	4	100.00
Discontinue	56.00	17.25	-	NA	Shifted to Happy Seeder	23	82.14
					Reduction in yield	3	10.71
					Weed problem	2	7.14
					Rodents	2	7.14
					Stubbles affects functioning	1	3.57

*Multiple Responses, NA= Not Applicable, Per cent change= from year 2018-19 to 2019-20.

Area 1= Average present area under zero till technology, Area 2= Average prospected area under zero till technology

Table 4: Distribution of respondents on the basis of problems faced in adoption of zero till drill

Problems	Frequency*	Percentage
Zero till drill can only be used after straw removal	14	28.00
Rodents	10	20.00
It cannot run in stubbles	8	16.00
It cannot run in high moisture fields	2	4.00

*Multiple Responses

Table 5: Distribution of respondents on the basis of suggestions for use of zero till drill

Suggestions	Frequency*	Percentage
Could be used effectively after straw burning	5	10.00
Could be used effectively if loose straw burned	3	6.00

*Multiple Responses

moisture fields. These finding confirm the observation of Kumari *et al.* (2018); Singh (2016); Kumar (2002) and Thakur *et al.* (2018). On the other hand, these findings of the study are not in harmony with those reported by Tripathi *et al.* (2013); Tripathi (2014) and Prem *et al.* (2017).

After discussing the problems, the respondents were asked to give suggestions to enhance the overall

performance of zero till drill. A total of 16.00 per cent of zero till drill users suggested that machine can be used effectively only after straw burning as this was one of the prerequisites in operation of zero till machine that field should be cleaned properly from straw (Table 5). These results are in conformity with those reported by Sidhu and Beri (2005) and Tiwari (2008).

Factors influencing the prospects of Zero Till Technology

To study the factors affecting prospects of zero till drill, ordinal regression analysis was used. It is clear from the data in Table 6 that age was negatively correlated ($p \leq 0.05$) with the prospects of zero till drill i.e. young aged farmers were more likely to increase the use of zero till drill as compared to old aged farmers. Similarly, operational land holding of the farmers affects the prospects of zero till drill as a significant negative correlation ($p \leq 0.05$) was observed between prospects and operational land holding. It can be concluded that farmers with large operational land holding were having negative prospects towards zero till drill i.e. want to discontinue the adoption or decrease the area under this technology. This was mainly due to the reason of shift of farmers from zero till drill to happy seeder technology for wheat sowing. Innovativeness and economic motivation of the farmers influence positively to the

Table 6: Impact of socio personal factors on prospects of zero till drill

Factors/Covariates	Estimate	Std. error	Wald	Sig.
Intercept (α_i)				
Discontinue (1)	16.304	6.664	5.985	0.014
Decrease (2)	16.847	6.699	6.324	0.012
Constant (3)	18.801	6.801	7.642	0.006
Location (β_i)				
Age	-0.087	0.042	4.38	0.036
Education	-0.376	0.179	4.416	0.096
Operational land holding	-0.082	0.038	4.743	0.029
Innovativeness	5.138	2.002	6.588	0.01
Risk orientation	-3.714	1.409	6.949	0.008
Economic motivation	8.999	2.859	9.905	0.002
Attitude	-0.187	1.214	0.024	0.878
[Family type =joint]	-1.757	0.974	3.255	0.071
[Family type =nuclear]	0*	-	-	-

*This parameter is set to zero because it is redundant.

prospects of zero till drill as correlation was found to be significant ($p \leq 0.01$). Results point toward the conclusion that innovative and economically motivated farmers will increase/keep area constant under zero till drill.

It was interesting to note that risk orientation was negatively correlated ($p \leq 0.01$) with prospects of zero till drill. For high risk-oriented farmer the prospects towards zero till drill will be negative i.e. want to discontinue the adoption or decrease the area under this technology. This was due to the introduction of a parallel technology i.e. happy seeder to the farmers. So, farmers with high risk orientation want to try new technology by decreasing/discontinuing the adoption of zero till drill. Attitude of farmers towards zero till didn't have any significant impact on prospects regarding zero till drill. Another independent variable "joint family" was categorical variable. It was correlated negatively ($p \leq 0.10$) with prospects of zero till drill i.e. farmers belong to joint family system were more likely to express negative prospects toward zero till drill. It may be due to the reason that in joint family system decision making of an individual is pretentious to family members.

CONCLUSION

The study has identified the prospects of zero-till drill and the different factors affecting its prospects. The results show that more than half of the farmers wanted to discontinue zero till drill in coming years due to the shift towards its parallel technology i.e. happy seeder. About one fourth of the farmers willing to keep area constant under zero till drill. More than two third of farmers indicated to have favourable attitude towards zero till drill. Among the problems, major were that zero till drill can only be used after straw removal and functioning of zero till drill affected by stubbles as it needs fields to be cleaned properly. Determinants significantly influencing the prospects of zero till technology were age, operational land holding, family type, innovativeness, risk orientation and economic motivation of farmers. For the better adoption of technology, suitable equipment and practices need to be developed for the collection of loose straw left in the paddy field as loose straw emerged as a major problem faced by the respondents.

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Adoption of Improved Dairy Management Practices by the Women Dairy Farmers in Deoghar District of Jharkhand

Sudhanshu

ABSTRACT

Study was conducted in Deoghar district of Santhal region of Jharkhand state to ascertain the extent of adoption of improved dairy management practices by the women dairy farmers. Five villages with maximum women dairy farmers from Deoghar block and from each village 24 women dairy farmers were selected randomly. It was observed that majority of the respondents (93.30%) ensure the sufficient supply of clean and fresh water to the animal, 75.83 per cent having awareness of heat symptoms, 86.60 per cent segregation of sick animals from healthy ones and 80.83 per cent aware about keeping of animal loose in the shed. It was also observed that majority (56.66%) of respondents have medium level of adoption of improved dairy management practices followed by (22.5%) respondents have low level of adoption and 20.83 per cent have high level of adoption about improved dairy management practices.

Keyword: Adoption, Breeding, Feeding, Improved practices, Management

INTRODUCTION

India has the largest bovine population in the world and is also the single largest milk producing country but the productivity per animal is very poor. Livestock sector contribute around 3.2 per cent value of total GDP, whereas agriculture contribution in total GDP is 13.90 per cent (National Accounts Statistics, Central Statistical Organisation, GoI, 2013). In India, milk and milk product contributes around 30 per cent of the household income, its contribution categorized from 19 per cent in the case of large farmers and about 53 per cent in case of landless category (Shukla and Brahmankar, 1999). India has witnessed a rapid increase in milk production during the last two and half decades and now holds the first position in the world by producing about 86 million metric tons of milk per annum. Livestock and dairy has been one of the sectors in India where female work force participation has been high. Majority of rural women are involved in animal husbandry, but the nature and extent of their

involvement varies widely and is strongly influenced by their economic status, caste and ethnic background. Women are the prime decision makers in dairy production activities such as utilization of milk, care of pregnant animals and calves, brining of fodder and feeding of concentrate. Present investigation is an effort to ascertain the adoption of improved dairy management practices by the women dairy farmers.

METHODOLOGY

The data were collected from Santhal region of Jharkhand. From Santhal region one district namely Deoghar was selected purposively due to large number of people doing dairy farming and the presence of milk procurement union of state. Then Deoghar block was selected purposively on the basis of maximum number of dairy farmers and top five villages with maximum women dairy farmers were selected purposively. From each village 24 women dairy farmers were selected randomly

to make a total of 120 women dairy farmers as the respondents for this study. Data were collected with the help of structured interview schedule divided in sub heads viz; feeding, breeding, health care and management practices. The response of the respondents were taken against each of the practice on a three point continuum representing Adoption, Partial adoption and Not adoption with scores of 2, 1 and 0 respectively. The respondents were categorized into low, medium and high categories of adoption on the basis of mean and standard deviation of score in different aspects of adoption as well as overall adoption of improved dairy management practices. The following formula was used to measure the adoption level of different aspects of improved dairy management practices.

$$\text{Adoption Index} = \frac{\text{Score obtained by an individual}}{\text{Maximum obtainable score}} \times 100$$

RESULT AND DISCUSSION

Adoption of improved feeding management practices by women dairy farmers plays a key role in increasing production and productivity of dairy animals. Table 1 indicate that majority of respondents i.e. 81.60, 67.5 81.6, 80.00, 90.00 and 76.67 per cent were found adopting the regular grazing, feeding advance pregnant animal with extra concentrate, feeding of prepared hay/silage, feeding colostrums to newborn calf, feeding concentrate to

animals on the basis of milk production, regular feeding of recommended dose of green fodder to the animal respectively.

In case of breeding practices, it was found that practicing pregnancy diagnosis between 60-120 days after service was the main breeding practice which was adopted by 60.00 per cent of farmers. 54.16 per cent of respondents were taking help from veterinarian during parturition of animals. Regular watching on estrous cycle and heat symptoms of dairy animals was adopted by 60.00 per cent of respondents. Inseminating the animals when it is in peak heat period was adopted by 51.66 per cent women dairy farmers. 75.83 per cent respondents have adopted AI with improved germplasm because the availability of improved germplasm is very good.

In case of improved health care practices it was found that treatment of sick animals/repeat breeders and anoestrus by veterinary doctors was mainly adopted by 85.00 per cent of respondents followed by segregation of sick animals from healthy ones was adopted by 86.67 per cent of respondents. Nearly half of the respondents were using only veterinary medicines as prescribed by veterinarians, protection of animals from severe disease, applying of pesticides for prevention of ticks and mites.

Majority of respondents (79.66%) were adopting different practices like de-horning in calf on proper time,

Table 1: Respondents' level of adoption of improved dairy practices

S. No.	Practices	A		PA		NA	
		f	%	f	%	f	%
a) Feeding							
1	Regular grazing	88	73.33	32	26.66	0	0
2	Feeding advance pregnant animal with extra concentrate	78	65.00	42	35.00	0	0
3	Feeding of mineral mixture for fertility improvement	53	44.16	67	55.83	0	0
4	Cultivation of high yielding varieties of fodder	55	45.83	65	54.16	0	0
5	Feeding of prepared hay/silage	72	60.00	48	40.00	0	0
6	Feeding colostrums to newborn calf.	96	80.00	22	18.30	0	0
7	Feeding concentrate to animal on the basis of milk production	81	67.50	39	32.50	0	0
8	Regular feeding of recommended dose of green fodder to the animal	74	61.66	46	38.33	0	0
9	Application of recommended dose of manure and fertilizers in the fodder crops	52	43.30	68	56.60	0	0
10	Ensuring appropriate storage conditions to avoid feed spoilage or contamination	58	48.30	62	51.60	0	0
11	Ensuring a sufficient supply of clean and fresh water	112	93.30	8	6.66	0	0

Table 1 contd...

S. No.	Practices	A		PA		NA	
		f	%	f	%	f	%
b) Breeding							
1	Practicing pregnancy diagnosis between 60-120 days after service	72	60.00	48.00	40.00	0	0
2	Help taken from veterinarian during parturition	65	54.16	55	45.83	0	0
3	Practicing AI with improved germplasm	51	42.50	69	57.50	0	0
4	Inseminating the animals when it is in peak heat period (i.e. after 8 hrs of onset of heat)	62	51.66	58	48.33	0	0
5	Having awareness of heat symptoms	91	75.83	29	24.16	0	0
6	Regular watching on estrous cycle and heat symptoms	72	60.00	48.00	40.00	0	0
7	Drying of animals 2 months before parturition	53	44.16	67	55.83	0	0
c) Health care							
1	Treatment of sick animals/repeat breeders and anoestrus by veterinary doctors	102	85.00	18	15.00	0	0
2	Immediate care of sick animals and follow-up	73	60.30	47	39.16	0	0
3	Segregation of sick animals from healthy ones	104	86.60	16	13.30	0	0
4	Applying of pesticides for prevention of ticks and mites etc.	62	51.60	52	43.30	6	5.00
5	Timely vaccination of FMD and H.S.	68	56.60	49	40.30	3	2.50
6	Timely treatment of sick and weak animal by Veterinary Doctors	73	60.30	42	35.00	5	4.16
7	Using only veterinary medicines as prescribed by veterinarians	62	51.60	58	48.33	0	0
8	Protection of animals from severe disease	61	50.300	59	49.16	0	0
9	Segregation of diseased animals suffering from contagious diseases	67	55.83	48	40.00	5	4.16
10	Help taken from veterinarians during the sickness of animals	82	68.30	38	31.66	0	0
d) Improved management practices							
1	Practicing de-horning in calf on proper time	74	61.66	46	38.33	0	0
2	Keeping the animal and newly born calf at warm place just after calving	92	76.66	28	23.33	0	0
3	Keeping of animal loose in the shed	97	80.83	23	19.16	0	0
4	Separation of pregnant animal from the herd	92	76.66	28	23.33	0	0
5	Practicing weaning in calves	95	79.16	25	20.83	0	0
6	Keeping of animals in ventilated house	77	64.16	43	35.83	2	1.60
7	Adequate open space for the animal	72	60.00	48	40.00	0	0
8	Wallowing of animal in pond	75	62.50				
9	Practicing de-worming in calf	92	76.66	28	23.33	0	0
10	Keeping the animal on a concrete floor	91	75.83	29	24.16	0	0
11	Maintaining clean housing and milking area	72	60.00	48	40.00	0	0
12	Ensuring milking utensils are cleaned before and after each milking	71	59.16	49	40.83	0	0
13	Ensuring milking utensils are cleaned before and after milking	68	56.66	52	43.33	0	0
14	Maintaining clean housing and milking area	81	67.50	39	32.50	0	0
15	Arranging adequate milk storing containers	82	68.33	38	31.66	0	0
16	Practicing full hand method of milking	71	59.16	49	40.83	0	0

A=Adopted, PA=Partial adopted, NP=Not adopted, f= Frequency, %= Percentage

Table 2: Categories of respondents according to their adoption level of improved dairy management practices

Level of adoption	Adoption level of different IDMPs									
	Breeding		Feeding		Health care		Management		Overall IDMPs	
	f	%	f	%	f	%	f	%	f	%
Low	25	20.83	31	25.83	33	27.50	41	34.16	29	24.16
Medium	72	60.00	63	52.50	70	58.33	67	55.83	64	53.33
High	23	19.16	26	21.66	17	14.16	12	10.00	27	22.50

f= Frequency, %= Percentage

keeping the animal and newly born calf at warm place just after calving, keeping of animal loose in the shed, separation of pregnant animal from the herd, practicing weaning in calves among improved management practices 76.66 per cent of respondents followed the practices of keeping of animals in ventilated house, adequate open space for the animal, wallowing of animal in pond, practicing de-worming in calf, keeping the animal on a concrete floor, maintaining clean housing and milking area.

Table 2 displays the result of overall level of adoption of improved dairy management practices, classified into low, medium and high adoption categories on the basis of mean and standard deviation. The data show that among women dairy farmers the majority of the respondents (60.00%) had medium level of adoption of breeding practices. In case of feeding practices majority of the respondents (52.50%) were in medium level, followed by low (25.83%) and high (21.66%) level of adoption. Regarding healthcare practices most of the respondents (58.33%) were observed in medium category, followed by low (27.50%) and high (14.16%) level of adoption of improved healthcare management practices whereas the management practices were adopted by majority of the respondents (55.83%) in medium category, followed by low (34.16%) and high (10.00%) level of adoption. Majority of the respondents (53.33%) had medium level of overall adoption of improved dairy management practices, whereas, 24.16 per cent in low and 22.50 per cent high level of adoption of overall improved dairy management practices. The findings are in conformity of Singh *et al.* (2017) whereas it was reported that majority had medium level of knowledge about animal management and health care.

CONCLUSION

It can be concluded that majority of respondents have medium level of adoption about improved dairy management practices. Extent of adoption of the improved dairy management practices viz, Breeding Feeding, Healthcare and Management were found to be of medium category. Minimum adoption level was found in case of breeding practices and maximum adoption level was found in case of feeding practices. Therefore, recommendation on the basis of findings and observations can be made that efforts should be made to encourage the women dairy farmers for the adoption of record keeping, artificial insemination, timely pregnancy diagnosis, de worming, providing fresh water, timely vaccination, feeding mineral mixture and concentrate, castration of male calves and other selected improved dairy management practices. Besides, women dairy farmers should be motivated for attending vocation training on improved dairy management practices, educational programs like demonstrations. Simultaneously, government needs to focus on efficient marketing channel for procuring milk at appropriate price.

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A Study on Mobile Based Agro-advisory in Meghalaya

Ram Singh¹, M. Premjit Singh², R.K. Singh³ and J.K. Chauhan⁴

ABSTRACT

The ICT is a partial tool to enhance the productivity and profitability of the farmer. Various initiatives in IT (Information Technology) were launched in the state to boost up the yield of crops in order to enhance the livelihood and income of the farmers. Among the initiatives one agro-advisory laboratory has been established under the programme of “Development and Deployment of Mobile based Agro- advisory system in North-East India (hereafter m4agriNEI)” in College of Post Graduate Studies, Central Agricultural University, Barapani. The present study was conducted in 11 villages of Ri-Bhoi district of Meghalaya. Over 218 farmers were randomly selected from the eleven villages. Data were collected by using pre-tested structured interview schedule through personal interview method. The tabular analysis was done to study the perception and accrual of benefits of the programme for the farmers located in remote villages. The farmers expressed that the information gathered through agro-advisory were very useful and helpful for them. The programme has gained lot popularity among the farmers of Meghalaya and the sufficient numbers of beneficiaries were found to be benefitted by using the agro-advisory in the crop as well as in livestock sector. Among the crops, the ginger crop being a cash crop of the state need more care right from its planting to harvesting. The agro-advisory on complete package and practices especially in selection of rhizome, its treatment, maintaining spacing during the planting and also the tips of proper care during harvesting provided by experts of agro-advisory really became the boon in production of ginger in the state. Providing the artificial insemination and vaccination in pig and piglets encouraged the farmers to come forward to access more and more information from Agro-advisory services. Keeping the success in view the funding agency has extended the finance support two times. Hence, to provide the agro-advisory in sustainable manner, the Government of Meghalaya taken over the Laboratory which has added one more component viz, mobile marketing vans for agri-produce from farmers to market in the state

Keywords: Agro-advisory, Lesson, Meghalaya, Mobile, Tribal

INTRODUCTION

Meghalaya state is the homeland of tribes namely *Khasi*, *Jaintia* and *Garo*. The schedule tribes comprise more than 86 per cent of the total population in the state. The tribal people of Meghalaya are the world's largest surviving matrilineal culture. They follow the traditional matrilineal norm. The state is basically rural based with agriculture as the predominant role in the state's economy around 80 per cent of its population depending entirely

on agriculture for their livelihood (GOM, 2015). The cropping intensity of the state is estimated as 119 per cent. It is low compared to national level. The state's agricultural system is predominantly traditional. The state being agrarian, economy also depends on animal husbandry. The various big animals such as cattle (767 thousand), Buffaloes (18 thousands), pigs (420 thousand) small animals (2821 thousand). Fish production annually accounted as 3.9 thousand ton in the state (Anonymous, 2008). According to basic statistics of NER, 2006, the

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overall geographical land-to-man ratio for the NE region (0.67 ha/Person) is much higher than the national average (0.32 ha/Person). The soil and climatic condition of the state is suitable for growing different types of agricultural crops from cereals to fruits in both tropical and temperate climatic environment occurring on different altitudes. Though, 81 per cent of the population depends on agriculture, the net cropped area is only about 9.87 per cent of the total geographical area of the state (GOM, 2015).

Food grains are the most important crops in the state and cover an area of over 60 per cent of the total crop area. The state is still deficit in food grains by 1.22 lakh tonnes annually to feed a population of 2.3 million. This is due to a lot of constraints, such as the undulating topography, transport and communication problem, population dispersal pattern, inadequate credit support, poor marketing system, etc. State's climate is very much favourable to produce all types of crops such as cereals (rice and maize), fruits (mandarin and pineapple), spices (ginger and turmeric), medicinal crops, flowers and cash crops (cashew nut and tea leaves) etc. Mostly, the farmers in rural areas have to deal with frequent crop failure and animal illness due to limited accessibility of agro-advisory particularly farmers of remotely located villages in difficult terrain. They have to walk for long distance to get solutions of their problems and it incurs time and money a lot. As everything else wait, but agriculture never (Nehru, 1947) becoming more relevant for such type of area where getting information/advisory and same time providing the advisory to the farmers located in remote village is really a challengeable task.

About the Agro-advisory System

Agriculture in the state could benefit tremendously with the application of ICTs (Information and Communication Technologies) especially in bringing changes to socio-economic conditions of the poor in the backward areas. Therefore, different initiatives in IT sector were launched in the state to provide the agro-advisory to farmers. Among the initiatives an agro-advisory system launched under the project of "Development and Deployment of Mobile based Agro-advisory system in North-East India (hereafter

m4agriNEI)" by the Central Agricultural University (hereafter CAU) at Barapani in the state. The system is started with collaboration of Media Lab Asia, New Delhi funded by IT department, government of India, New Delhi. The m4agriNEI is an integrated system with a combination of Web, Interactive Voice Response System (IVRS) and mobile technologies for dissemination of farm and farmer specific advices/information at user desired mode and time it has Toll Free Number (1800-345-3700). It is a mobile based pull and push system where agriculture related information can be pulled/pushed by the farmers using their mobile phones. There is a mobile interface at front end for the farmers and web interface at the back end for the agri-experts. The system allows transmitting the data through voice, texts, images and videos from both end (farmers to expert and vice versa). Also, the farmer can call the system to get any information as well as to get agro advisory. Farmer receive information (SMS/Voice Call/ Data on Smart Phone) for only those services for which he has subscribed and has an option at a later date to either select some more services or unsubscribe to some of the existing services. The system is connected to a centralized database, which has all information of farm, farmer and previous transactions. The experts at back end (data centre and virtual expert) can access to the database of the farmers while responding the farmer's queries and only registered user can access the m4agriNEI system. There is a mobile interface at front end for the farmers and web interface at the back end for the agricultural experts (Level-I and Level-II). Further, designated Farmer Co-ordinators and rural youth facilitate the registered farmers in getting farm information and knowledge and also they provide feedback to the m4agriNEI system. The system is connected to a centralized database, which have informations on farmer, farm history, and previous interactions (Figure 1).

Components of Agro Advisory

Agro-advisory (m4agriNEI) is an integrated system with a combination of Web, IVRS and Mobile applications for dissemination of farm and farmer specific advices/information at user desired mode and time (Figure 2). Each component is described as under:

Figure 1: System architecture of Agro-advisory & Activity frame work

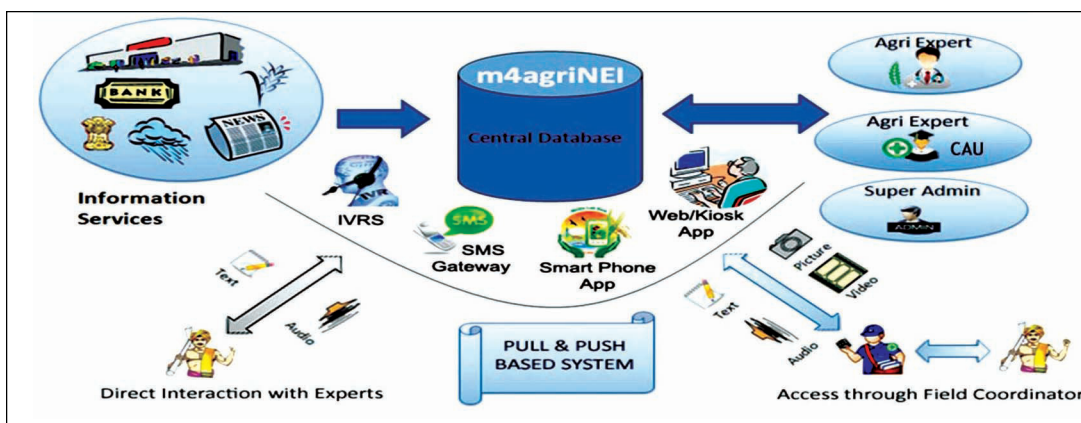


Figure 2: Component of Agro Advisory



Mobile application for smart phones (Android and Windows)

- Standalone Application.
- Offline query aggregation capabilities.
- Data Synchronization at hot spots / areas of data connectivity (store and forward).
- Offline capability of display of last synchronized data.
- Coordinator information system (profile page, visit scheduling, list of registered farmers).
- Farmer registration and profile.

Web based application

- Colour coded iconic based logins for various type of users.
- Expert support system linked with authentic content /information service providers.
- Information dissemination and aggregation system (multimodal).

- Centralized common database for web, mobile & IVRS applications.
- Currently available in English, Khasi and Garo.
- Reports and analytics.

Interactive Voice Response System (IVRS) based application

- Call incoming facility on expert's computer.
- Call forwarding and recording facility in case if the experts are not available.
- Intelligent enough to route the call to the relevant experts.
- 24x7 query registration facility for farmers.

METHODOLOGY

The agro-advisory service is being provided to 2813 numbers of farmers of 47 villages of Ri-bhoi district. The registered farmers on a specific form are being served by the mobile based agro-advisory service system. The

system displaying the all history of the farmers which include the information of name, village name, photo of the farmer and crops grown by the farmers as and when call landing to system. An impact assessment of the project was conducted in 11 villages of Ri-Bhoi district of Meghalaya. A sample of 218 farmers has been drawn randomly from the eleven selected villages. Data were collected by using pre-tested well structured interview schedule through personal interview method. The simple tabular analysis was done to study the impact of the programme in the state.

RESULTS AND DISCUSSION

Analysis of Queries

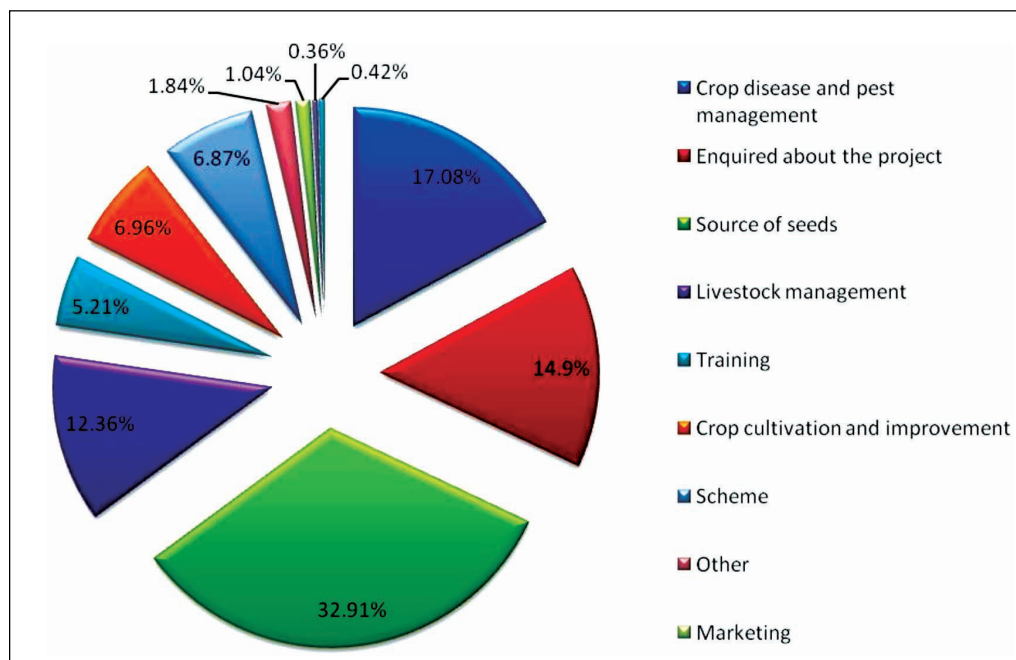
The query analysis is presented in Table 1 and Figure 3. The farmers raised query about the seed and its source which was accounted of 32.91 per cent of the total queries. Improved seeds of ginger, tomato, paddy, French bean, maize, chilli, flower and other vegetables were the seeds wanted by farmers. Piggery piglets, poultry chicks (Kuroiler, layers) and fish fingerlings were queries among livestock which enquired by the farmers. The second highest number of queries raised by the farmers was on crop disease and pest management and accounted to be 17.08 per cent of the total queries. Farmers enquired on modern scientific preventive measures of various diseases

Table 1: Query analysis

Type of Query	Total	Percentage
Source of seeds	1073	32.91
Crop disease and pest management	557	17.08
Enquired about the project	486	14.9
Livestock management	403	12.36
Crop cultivation and improvement	227	6.96
Scheme	224	6.87
Training	170	5.21
Other	60	1.84
Marketing	34	1.04
Fishery management	12	0.36
Nutrient management	14	0.42
Total	3260	100

and pests. Crop disease and pest management of ginger (soft rot disease, shoot borer), preventive measures of paddy diseases (*blast disease, brown spot, bacterial blight, Udbatta disease*) and pests (*Gundhi bug, cutworm, white grub, rice leaf folder, rice case worm, and rodents*) and for french bean (*leaf miners and aphids*). The 14.90 per cent of query rose to know about the agro-advisory system and toll free number. Similarly, 12.36 per cent of the queries were raised about livestock management, in which maximum on piggery which related to skin infection, de-worming of pig, artificial insemination, vitamins, *coughing, diarrhoea, swine fever, castration*

Figure 3: Analysis of Queries



which was followed by preventive measures of *rani khet coughing*, *diarrhoea* disease of poultry. Further, the query on crop cultivation and improvement of crops was observed to be 6.96 per cent of total queries in which information enquired on scientific management and improvement of cultivation of different crops like ginger, onion, paddy, tomato, cauliflower, orange, mustard and other crops. An about 6.87 per cent of the queries were raised about the welfare schemes launched by state government. Some of the farmers were found to be very much interested on trainings of which 5.21 per cent of the queries were on trainings related to piggery, poultry, ginger cultivation, fish farming, mushroom cultivation, paddy cultivation, beekeeping, flower cultivation, vegetable cultivation etc. A few queries were raised on nutrient management, fishery management, marketing etc.

Monthly Analysis of queries

It can be observed from the Figure 4 that the queries raised by the farmers in the beginning (June'13) accounted to be only 0.42 per cent of the total queries. This may be due to unawareness of farmers about toll free number and due to lack of initial inhibition of the farmers to make calls to the agro-advisory. But as the service moved forward, the farmers have started to raise queries through the toll free number of which the highest percentage of the queries was observed in the month of May 2014 and

it was estimated to be 8.34 per cent and it may be due to the fact that the May month is an active growing period for rice, ginger and turmeric crop in the state.

Queries from different channel

The different channel used to raise the by the farmers is presented in Table 2 and Figure 5. Most of the farmers are reluctant to raise queries by themselves through the toll free number so overcome to this problem assistance of Farmer Coordinator were asked to assist the farmers to raise query to the agro-advisory lab. But after much effort made by the project team through awareness, training programmes conducted, field visits by level-1 and level-2 experts the farmers started to raise queries on their own. Farmers raised their queries through different channel of which 77.20 per cent of the queries were raised with the help of the Farmer Coordinator and followed by Level-I expert assistance which was accounted to be 16.80 per cent. An around 5.18 per cent of the queries were raised by farmer themselves without any assistance through toll free number.

Perception about the mobile based agro-advisory

As a whole, the project design was flexible enough to accommodate changing situations of farming system of the farmers. All of the respondents were fully aware

Figure 4: Monthly Analysis of Queries

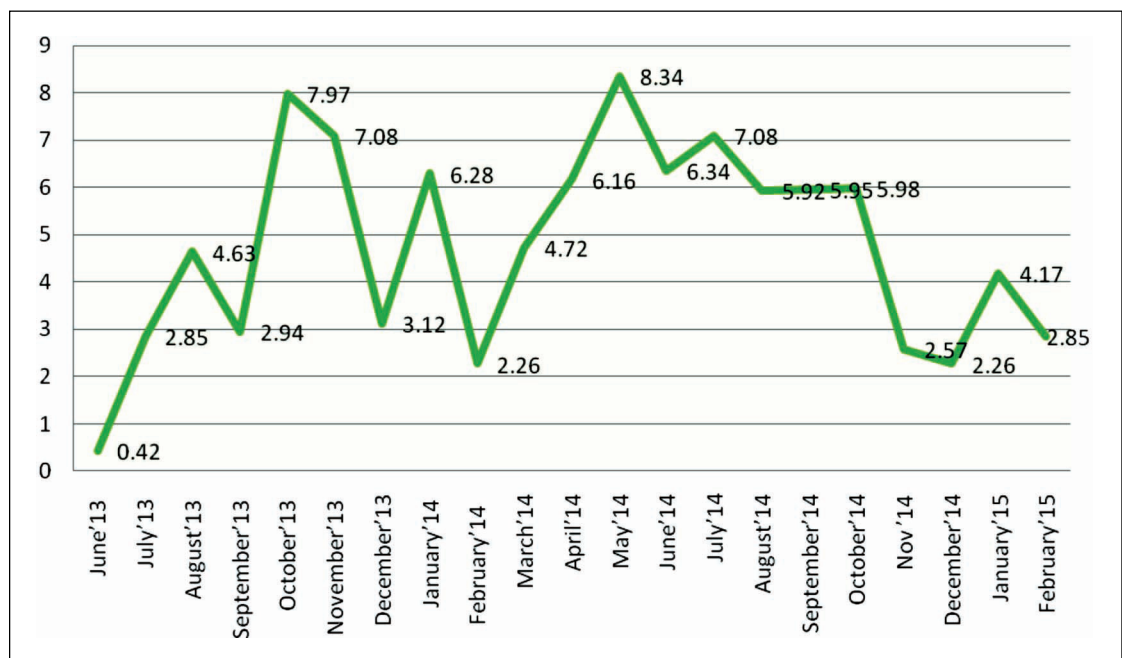
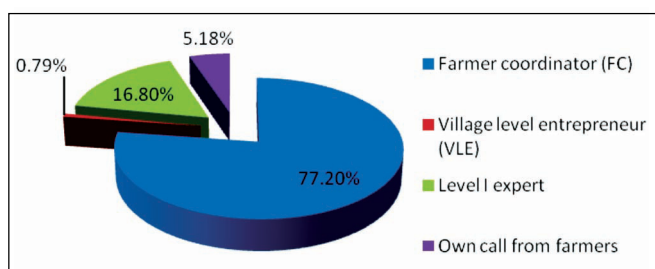


Table 2: Queries raised by the farmers through different Channel

Channel	No. of Queries	Percentage
Farmer coordinator (FC)	2517	77.20
Village level entrepreneur (VLE)	26	0.79
Level I expert	548	16.80
Own call from farmers	169	5.18
Total	3260	100

**Figure 5: Queries from different channel**

of the project through different sources: 52.29 per cent through repeated on-site awareness/training programmes, 37.61 per cent through farmer coordinators and 10.09 per cent through interaction with the project team members during their field visit programmes (Table 3).

Table 3: Awareness about the mobile based agro-advisory (n=218)

Source	Response
Awareness/Training programmes	114 (52.29)*
Farmer Coordinator	82 (37.61)
Through project team home/field visit	22 (10.09)

*Figures in parenthesis indicate percentage to total

The information provided through the m4agriNEI team was clear to 92.20 per cent, easily understandable to 91.28 per cent, timely to 76.14 per cent, complete to 41.73 per cent and practicable/adaptable in field conditions to 37.61 per cent (Table 4).

Majority of the respondents were satisfied with the information provided by the m4agriNEI team on pest and disease management on ginger and 82.11 per cent of respondents responded in this favour. About 69.66 per cent of participants reported that training provided on ginger cultivation was beneficial for them. Around 19.26

Table 4: Perception about the quality of information and advisory support

Perception	Response (%)
Clear information	92.2
Easily understandable	91.28
Timely information	76.14
Complete	41.73
Practicable / adaptable in the field conditions	37.61

of farmers were satisfied with the training conducted on improved variety of ginger. Hence, training and information provided by the agro-advisory to the farmers on ginger was appreciated by majority of the farmers since, the ginger being a high value crop is contributing lion share in the livelihood and income of the farmer. Other hand 66.05 per cent of farmers reported that advisory provided on piggery was beneficial. The advisory given on rice crop only 7.33 per cent of rice growers reported it as beneficial since rice is grown long back and mostly of farmers are very adamant to cultivate rice in traditional method and another reason the rice is grown only for home consumption not for commercial purpose (Table 5).

Table 5: Knowledge gained through mobile based agro-advisory

Sectors	Response (%)
Ginger	
Pest and disease management	82.11
Training	69.66
Improved variety	19.26
Piggery	66.05
Rice	7.33

The information provided through m4agriNEI service was fully utilized by 17.88 per cent of the respondents in terms of piggery while 26.60 per cent have partially utilized that information. In terms of information related to ginger crop, 2.75 per cent of the respondents have fully utilized the information while 33.94 per cent have partially utilized that information. In case of rice, 2.75 per cent of the respondents have partially utilized the information (Table 6).

Table 6: Extent of information utilization by the farmers provided through mobile based agro-advisory

Sectors	Extent of utilization (%)	
	Full	Partial
Ginger	2.75	33.94
Piggery	17.88	26.60
Rice	00	2.75

Table 7: Perceived accrual of benefits by the farmers from agro-advisory services

Sectors	Response (%)
Animal husbandry	19.72
Progress in crops	18.80

About 19.72 per cent of the respondents expressed that they were benefitted due to m4agriNEI service with regard to ginger cultivation technology and sources of availability of healthy rhizomes (Table 7).

CONCLUSION

The farmers expressed that the information gathered through agro-advisory were very useful and helpful for them for collaborative learning with peers and experts. The farmers found to be taking interest to access the information in management of crops and animal husbandry. The seed for crops and pig management were the major aspects on which farmers were interested to get information. At initial stage of the programme, the sufficient numbers of beneficiaries were found to be benefitted by using the agro-advisory. Moreover, its success has provided and extended financial support twice and it has attracted the state Government of Meghalaya for taken over under the administration and

finance control of local government. It led the sustainability forever the intervention. Hence, to provide the agro-advisory in sustainable manner, the convergence of such type of programmes with state department in other states of the region considering the technical help from Central Agricultural University along with KVKs personnel is highly recommended so that it will help to uplift the livelihood of rural tribal in rapid way.

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Constraints Faced by the Beneficiaries of Citrus Estates in Citrus Cultivation

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ABSTRACT

Citrus is a non-traditional crop in Punjab state, hence, it became evident to promote citrus crop and to give knowledge to the farmers about most up-to-date techniques of citrus planting, management, harvesting and marketing of this crop. Therefore, the Punjab Government through the State Department of Horticulture established five Citrus Estates in natural citrus growing area of the Punjab during 2007. The study to identify the constraints faced by the beneficiaries of citrus estates in citrus cultivation in Punjab sampled 200 beneficiaries, through stratified multistage random sampling design. The average operational land holding of all respondent beneficiaries was 10 acres. The technical constraints got first rank followed by storage & marketing constraints with average mean score 2.271 and 2.244. Under different five areas, susceptibility towards disease & insect-pest, unfavourable weather conditions, seasonal glut in market, lack of preservation industry in the area and lack of mechanization in citrus processing were the major constraints.

Keywords: Beneficiaries, Citrus, Citrus estates, Constraints, Preservation industry

INTRODUCTION

Citrus has become very popular among the farmers due to reasonable price and higher juice content (Anonymous, 2015a). In Punjab state 2.77 lakh hectares area is under horticultural crops with an annual production of 51.74 lakh tones whereas total area under fruit cultivation is 76.597 thousand hectares, with 15.41 lakh tones production (Anonymous, 2015b). Since, citrus is a non-traditional crop in Punjab state, hence, it became evident to promote this crop and to give knowledge to the farmers about most up-to-date techniques of citrus planting, management, harvesting and marketing. Therefore, Punjab Government through the State Department of Horticulture established five Citrus Estates in natural citrus growing areas of the state during 2007. All the infrastructural services are being provided under single roof in order to achieve high quality and productivity.

Five Citrus Estates established are Abohar (Fazilka), Tahliwala Jattan (Fazilka), Badal (Shri Muktsar Sahib), Hoshiarpur and Bhunga (Hoshiarpur). Establishment of Citrus Estate is also part of the Government's new approach to shift the spotlight away from traditional soil and water depleting patterns and to promote non-conventional farm activities for huge scale citrus production in Punjab (Anonymous, 2015b). It has been found that several farmers are utilizing benefits from these citrus estates. Thus, it becomes imperative to assess the impact on beneficiaries and to identify the constraints faced by the beneficiaries of citrus estates in citrus cultivation.

METHODOLOGY

This research investigation was carried out in five Citrus Estates of Punjab state. To select the area and

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respondent beneficiaries, a stratified multistage random sampling design was used. At first stage three districts i.e. Fazilka, Shri Muktsar Sahib and Hoshiarpur were selected purposively, at second stage, five Citrus Estates were selected from three selected districts (Abohar and Taliwala Jattan from Fazilka district, Badal from Shri Muktsar Sahib district and Hoshiarpur and Bhunga from Hoshiarpur district). At third stage lists of beneficiaries were obtained from five citrus estate societies. From these lists, 40 beneficiaries from each Citrus Estate were selected randomly to make a total of 200 beneficiaries. Data were collected through a personal interview technique by using pretested questionnaire and analysed by using frequency, percentage, mean score and average mean score.

RESULTS AND DISCUSSION

Socio-personal characteristics of beneficiaries

The detail regarding socio-personal characteristics of selected beneficiaries which include age, education, operational land holding (acres) has been tabulated in Table 1 and discussed. Age is an essential social variable as it affects the attitude and values of an individual to a great extent which regulates the status of the individual in the family and society. Data presented in Table 1 indicates that the age of respondent beneficiaries varied from 27-56 years. From the entire five Citrus Estates,

maximum respondent beneficiaries *i.e.* 43.00 per cent belonged to 37-46 years' age group. Almost one third of respondent beneficiaries *i.e.* 32.5 per cent belonged to the age group of 47-56 years; whereas 24.5 per cent respondent beneficiaries were recorded within the age group of 27-36 years. The findings further indicate that the average age of all respondent beneficiaries was recorded 42.38 years. Education as an important characteristic predicts knowledge and adoption. The data shows that maximum 24.5 per cent of the respondent beneficiaries were educated up to graduation, followed by 21.0 per cent and 20.5 per cent respondent beneficiaries educated up to matric and middle. From the total respondent beneficiaries 15.5 per cent were educated up to Senior Secondary, whereas 11.5 per cent and 7.5 per cent were educated up to primary and post-graduation. The data further pertaining that the mean educational level of the entire respondent beneficiaries was recorded between matriculations to senior secondary.

Operational land holding is assumed as an important variable that influences adoption behaviour of the farmer. It is common knowledge that availability of farm implement and other needful material increases in line with the operational land holding. It is apparent from data that relatively higher proportion of the total respondent beneficiaries were falling under semi-medium (5 to 10 acres) operational land holding followed by 29.5 per cent

Table 1: Distribution of beneficiaries according to their socio-personal characteristics (n=200)

S.No.	Socio-personal characteristics	Category/ range	Abohar (%)	Talliwala Jattan (%)	Badal (%)	Bhunga (%)	Hoshiarpur (%)	Total (%)
1.	Age (years)	27-36	22.5	25.0	25.0	22.5	27.5	24.5
		37-46	45.0	40.0	47.5	40.0	42.5	43.0
		47-56	32.5	35.0	27.5	37.5	30.0	32.5
		Mean	42.4	41.2	43.05	42.23	43.03	42.38
2.	Education	Mean Education (No. of schooling years)	11.9	10.8	10.88	10.63	11.0	11.04
3.	Operational landholding (acres)	Marginal (<2.5)	10.0	10.0	15.0	15.0	17.5	13.5
		Small (2.5-5.0)	25.0	30.0	27.5	32.5	32.5	29.5
		Semi-Medium (5-10)	27.5	27.5	35.0	32.5	30.0	30.5
		Medium (10-25)	20.0	17.5	12.5	15.0	12.5	15.5
		Large (> 25)	17.5	15.0	10.0	5.0	7.5	11.0
		Mean	14.00	9.60	11.05	7.45	7.92	10.00

respondent beneficiaries having small operational land holding. From the all respondent beneficiaries 15.5 per cent of the beneficiaries were falling under medium operational land holding, whereas 13.5 per cent and 11.0 per cent were having marginal and large operational land holding.

Constraints faced by the beneficiaries in citrus cultivation

The information regarding the constraints faced by the beneficiaries was studied in five subject areas *i.e.* technical, economics, storage and marketing, capacity building and general constraints. The information so collected has been presented in Table 2.

Ten important technical constraints were identified and ranked which acted as barrier in production of citrus crops. Disease sensitive crop was ranked as first constraints with a mean score of 2.63 followed by difficult

to protect crop from adverse weather conditions (2.58). The other technical constraints faced by the citrus growers in descending order of importance were problems of intercropping & intercultural operations, poor quality ground water for irrigation, long vegetative period *i.e.* unproductive period, irregular water supply from the canal, higher mortality of plant during initial years and lack of technology know- how with the mean scores 2.56, 2.46, 2.41, 2.40, 2.35 and 1.98 respectively. The least important technical constraints perceived by the beneficiaries were lack of knowledge about production & processing machinery and unsuitable soil for citrus orchard with mean score of 1.94 and 1.40 respectively. The type of constraints were observed by Sharma (2002); Mohammad (2000); Poonia (2002); Das *et al.* (2014); Raina *et al.* (2017) in different settings.

Among economic constraints, the seasonal glut in the market ranked first with a mean score 2.54 followed by

Table 2: Distribution of the beneficiaries according to constraints faced by them in citrus production (n=200)

S.No.	Constraints	Most severe	Severe	Least severe	Mean score	Rank
Technical constraints						
a	Lack of technology know- how	74	47	79	1.98	VIII
b	Unsuitable soil for citrus orchard	21	37	142	1.40	X
c	Higher mortality of plant during initial years	107	55	38	2.35	VII
d	Long vegetative period <i>i.e.</i> unproductive period	116	49	35	2.41	V
e	Irregular water supply from the canal	119	41	40	2.40	VI
f	Poor quality ground water for irrigation	115	62	23	2.46	IV
g	Lack of knowledge about production & processing machinery	67	54	79	1.94	IX
h	Problems of intercropping & intercultural operations	127	58	15	2.56	III
i	Susceptible towards disease & insect-pest	138	49	13	2.63	I
j	Frost inferior	134	47	19	2.58	II
Economic constraints						
a	Lack of credit facility in the area	98	42	60	2.19	V
b	Lack of subsidies	75	51	74	2.01	VIII
c	Perishable nature of commodity resulted in economic loss	92	51	57	2.18	VI
d	Costly & unskilled labour	86	49	65	2.11	VII
e	High initial cost in establishing orchard	118	63	19	2.50	III
f	High cost of inputs (fencing, plant materials, pesticides, fertilizers etc.)	120	62	18	2.51	II
g	Non-existence of processing units in the area	107	56	37	2.35	IV
h	High cost of transport of fruits	65	54	81	1.92	X
i	Seasonal glut in the market	135	37	28	2.54	I
j	Low prices of the citrus produce	62	71	67	1.98	IX

Table 2 contd....

S.No.	Constraints	Most severe	Severe	Least severe	Mean score	Rank
Storage and marketing constraints						
a	High fluctuation in the market prices	120	41	39	2.41	II
b	Lack of proper market	81	61	58	2.12	VI
c	Un-popular cooperative marketing system	88	65	47	2.21	IV
d	Lack of preservation industry in the area	128	44	28	2.50	I
e	General unawareness about citrus by-products and their nutritional importance	102	57	41	2.31	III b
f	Lack of storage facility in the area	96	70	34	2.31	III a
g	Mal-practices by middlemen	64	64	72	1.96	VII
h	Prices of citrus by-products are low	74	78	48	2.13	V
Capacity Building						
a	Lack of relevant literature	62	48	90	1.86	V
b	Lack of need based training	54	68	78	1.88	IV
c	Lack of technical advice facility in need	37	55	108	1.65	VII
d	Lack of motivating agencies in the area	18	29	153	1.33	VIII
e	Inadequate knowledge about citrus production	48	61	91	1.79	VI
f	Inadequate knowledge about processing and marketing	67	74	59	2.04	II
g	Lack of mechanization in citrus production	62	82	56	2.03	III
h	Lack of mechanization in citrus processing	89	69	42	2.24	I
General constraints						
a	Small land holding	118	53	29	2.45	II
b	Undulated Land	52	36	112	1.70	VIII
c	Unfavorable weather conditions (frost, drought, erratic rainfall)	139	42	19	2.60	I
d	Chance of theft	38	56	106	1.66	IX
e	Threat from wild and stray animals	70	53	77	1.97	V
f	Non-cooperation of private & govt. agencies in the area	46	57	97	1.74	VII
g	Lack of reliable source of plant material	95	34	71	2.12	III
h	Low consumption tendency of citrus in local area	83	46	71	2.08	IV
i	No timely sale of produce	64	58	78	1.93	VI

high cost of inputs (fencing, plant materials, pesticides, fertilizers etc.) with a mean score of 2.51. The other economic constraints in descending order of importance were high initial cost in establishing orchard, non-existence of processing units in the area, lack of credit facility in the area, perishable nature of commodity resulted in economic loss, costly & unskilled labour and lack of subsidies with mean score of 2.50, 2.35, 2.19, 2.18, 2.11 and 2.01 respectively. The least important economic constraints perceived by the beneficiaries were low price of the citrus produce and high cost of transport of fruits with mean score of 1.98 and 1.92 respectively.

The findings are supported by the findings of Pandey (1993); Mohammad (2000); Kumar *et al.* (2010). Among storage and marketing constraints lack of preservation industry in the area ranked first with a mean score of 2.50 followed by high fluctuation in the market prices with a mean score of 2.41, lack of storage facility in the area and general unawareness about citrus by-products and their nutritional importance at rank third with a mean score of 2.31. The least important storage and marketing constraint perceived by the beneficiaries was mal-practices by middlemen with mean score of 1.96. These findings are in line with the findings of Mohammad and

Punjabi (1997); Poonia (2002). Constraints under the category of capacity building included lack of mechanization in citrus processing as first rank with a mean score of 2.24 followed by inadequate knowledge about processing and marketing at second rank with a mean score of 2.04. The rank order revealed that lack of motivating agencies in the area was considered least important in this category with a mean score of 1.33. Among general constraints, unfavourable weather conditions (frost, drought, erratic rainfall) was ranked as first constraints followed by small land holding. The other general constraints perceived by the citrus growers in descending order of importance were lack of reliable source of plant material, low consumption tendency of citrus in local area, threat from wild and stray animals, no timely sale of produce and general carelessness of private & govt. agencies in the area.

The data further indicated that the technical constraints ranked first with highest average mean score of 2.271 followed by storage and marketing constraints with an average mean score of 2.244 at second rank. The constraints related to economics were at rank three with an average mean score of 2.229 while general constraints were at rank four with an average mean score 1.977. The capacity building constraints got last rank with an average mean score of 1.891.

CONCLUSION

Emphasis on development of infrastructure for storage, marketing, value addition and processing of citrus crop is the need of the hour. Development of suitable storage structures like zero energy cooling chamber, cold store, pack houses, and processing units for citrus at local level can enhance shelf life of fruits as well as the profit of citrus growers. More training are required to educate beneficiaries more about the technical aspects such as nursery raising and propagation, application of balanced fertilizers and micronutrients, irrigation scheduling, use of plant growth regulators, plant protection measures, chemical control of weeds and methods for long time storage of citrus fruits.

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A Study on Knowledge and Adoption of Dairy Farmers about Animal Husbandry Practices

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ABSTRACT

Livestock sector has played a crucial role in improving socio-economic status of farmers. The study was conducted purposively in Morar Block of Gwalior district with 120 dairy farmers. The data collected with the help of pre-tested interview schedule shows that more than half of the milk producers had medium level of knowledge regarding improved animal husbandry practices. About 58.00 per cent of the milk producer had medium level of adoption of improved animal husbandry practices.

Keywords: Adoption, Animal husbandry practices, Knowledge

INTRODUCTION

Since Vedic times, the dairying has been practiced as a way of life by the farmers of our country from generation to generation. Dairy farming has thus been recognized only next to agriculture as a source of income to the farmers. In spite of the fact that India has large cattle population in the world, the milk production per milch animal is low as compared to other dairy farming countries. According to 18th Livestock Census (2008) estimate about 16.21 and 58.21 per cent of world cattle and buffalo population in India. The total bovine (cattle and buffalo) population is about 62.91 per cent of the livestock of the country and the cattle and buffaloes are 185.181 and 97.922 million, respectively. Among cattle population, only 5.20 per cent population are crossbred whereas 94.80 per cent are indigenous animals.

A break-through in the field of animal husbandry is not possible without an effective communication support. Speedy dissemination of information and technological know-how to the farmers is essential for bridging the gap between the scientists and the farmers. The existing extension services are too small to perform this task so;

the new information communication technologies have tremendous speedy range and force of impact offer the greatest possibility for effective communication of animal husbandry technology. The recent advances in animal husbandry have demonstrated potential for maximization of milk productivity. Today, the new developments and techniques have taken over the old ones. However, number of the farmers still does not fully adopt animal husbandry related innovations.

Knowledge will be the power in the 21st century and it could be possible through use of print media like farm magazines, books, booklets, leaflets etc. for farmers. The widening reach of mass communication methods such as internet, radio, television, videos, krishi mela/ agricultural exhibition and print media offer good prospects for its effective utilization in disseminating agricultural information (Farrington *et al.*, 1998). It reaches the majority in a time efficient and cost-effective way through in terms of effective utilization of the information assimilated from mass communication methods remains an item of debate. However, milk route supervisors, progressive milk producers, friends and

relatives are still the major source of information used by dairy farmers (Singh *et al.*, 2014). The study to know the effect of major mass communication media towards improved animal husbandry practices of dairy farmers in the selected villages of the Morar blocks of Gwalior district focused to determine the level of knowledge and extent of adoption about animal husbandry practices among the dairy farmers.

METHODOLOGY

The study was conducted purposively in Morar Block of Gwalior district due to maximum dairy farmers in the block. The selected block comprises of 151 villages. A list of villages where animal husbandry practices are being carried by the farmers was prepared with help of extension officials. Out of which, 10 villages were selected randomly by using the sampling method for the study. After the selection of the villages, a village wise list of dairy farmers was prepared and 12 dairy farmers from each village were randomly selected. Thus, the total sample was consisted of 120 dairy farmers. The data were collected with the help of pre-tested interview schedule. The data thus collected was tabulated and presented in the form of tables and graphs as per necessity. Keeping in view the objectives of the study and to draw logical results mean, percentage, standard deviation, correlation and regression tests was applied where they were required.

RESULTS AND DISCUSSION

The knowledge of an innovation is prerequisite for adoption. A higher knowledge of technical nature of improved practices would lead to a higher adoption possibly because knowledge is inert. For measuring the knowledge regarding improved practices of animal husbandry, knowledge test was developed and information were collected for this purpose, respondents were classified in to three groups as shown in Table 1.

It is clear from Table 1 that majority (54.17%) of the respondents had medium level of knowledge regarding improved animal husbandry practices whereas, (12.50%) and (33.33%) of the respondents had low level and high level of knowledge regarding improved animal husbandry practices, respectively. As such, it can be concluded that

Table 1: Distribution of the respondents according to their knowledge about animal husbandry practices (n=120)

Level of overall adoption	Frequency	Percentage
Low (< 4.83 score)	15	12.50
Medium (between 4.83 to 8.03 score)	65	54.17
High (> 8.03 score)	40	33.33
Total	120	100.00
Mean ($\bar{x}$) = 6.43 SD = 1.60		

slightly more than half (54.17%) of the milk producers had medium level of knowledge regarding improved animal husbandry practices. Medium to high level of education and good extension contact, medium to high ICT exposure, medium to high degree of social participation might have been the reason for the above findings. However, a sizeable (12.50%) of dairy farmer had low level of knowledge for improved animal husbandry practices, needs special attention about training for holistic approach. The finding is buttressed by the study of Meena *et al.* (2017); Dana and Kanbid (1998); Kadian and Kumar (1999); Meena and Chauhan (1999) and Gour (2002).

The improved animal husbandry practices play an important role in improving the performance of milch animals and the upliftment of socio-economic status of dairy farmer, through different practices like reproductive practices – helps in timely heat detection, early age at first calving, number of artificial insemination/conception, pregnancy status, increase in reproductive efficiency and to solve the problems related to reproductive disorders. Nutritional practices—provide balanced diet through essential nutrients viz. DCP, TDN, Ca, P, vitamins and minerals to dairy animals, by feeding of quality green/dry fodder and concentrate mixture as required for body maintenance, milk production and reproduction. Managemental practices provides sufficient space, optimum macro and micro climatic conditions through comfortable housing, man-animal relationship, availability of fresh, clean water for various purposes and hygienic conditions are ultimately boost up the quality milk production. Whereas, disease control practices—prevent, cure the diseases viz. FMD, HS/BQ and mastitis, which control the mortality and morbidity in dairy animals to plug/secure the economic losses, while marketing practices – reduction in cost of milk production and maximization of

the net profit through marketing of milk/milk products, along with producers' and consumers' satisfaction. In nutshell, the modern animal husbandry practices of dairying not only bridge the gap between adopted practices and recommended practices, but also increase the impact on extent of adoption regarding improved animal husbandry practices by dairy farmers. Looking to this fact, the extent of adoption of major animal husbandry practices was measured in terms of reproductive, nutritional, management, disease control and marketing practices.

The data presented in Table 2 indicate that reproduction practices like artificial insemination in milch animals at proper time of heat with semen of good bull, diagnosis of pregnancy of milch animal between 60 and 90 days after service and proper treatment to the animals through veterinarian for repeat breeders, mastitis and anoestrus were adopted continuously by 80.00, 67.50 and 73.33 per cent of the dairy farmers, respectively. Whereas, reproductive practice like serving crossbred and indigenous cows/buffaloes within the recommended period after calving, diagnosis of pregnancy of milch animal between 60 and 90 days after service was not at all adopted. Present research finding point toward that majority (80.00%) of the dairy farmers had adopted artificial insemination in their milch animals. This finding is in line with Ingole *et al.* (1988); Yadav and Yadav (1994) and Gour (2002).

It is interesting to note that in case of nutritional practices like feeding of colostrums to new born calves within half an hour of birth, feeding of chopped fodders and balanced concentrate mixture with supplementation of mineral mixture on the basis of milk production, ad lib clean and fresh water to animals and high yielding varieties of fodder seeds were adopted continuously by 78.33, 68.33, 85.00 and 51.67 per cent of the dairy farmers, respectively. This finding is in line with Meena *et al.* (2017); Shirsath *et al.* (1994); Yadav and Yadav (1995) and Patel (1998). As far as management practices of animal husbandry were concerned, continuous adoption was observed by majority of the dairy farmers. Management practices like washing of hands and udder before milking, maintenance of cleanliness, comfort and ventilation in animal houses or sheds, use of sterilized

scissors/knife for cutting of naval cord and application of tincture iodine on the naval cord and full hand method of milking were adopted continuously by 96.67, 90.83, 62.50 and 81.67 per cent of dairy farmers. The higher level of adoption of milking practice (67.85%) reported by Yadav and Yadav (1994), while 51.00 per cent for milking, 57.00 per cent for housing and 60.00 per cent for management, as observed by Meena *et al.* (2017) and Patel (1998).

Disease control is an important practice in dairy farming to get expected level of healthy milk production. The data indicate that disease control practices viz. timely and regular vaccination against common contagious diseases such as FMD and HS/BQ, prompt reporting of outbreak of contagious disease to the local veterinarian and timely treatment of sick animals by veterinary doctor were adopted continuously by 75.00, 76.67 and 74.17 per cent of the dairy farmer. At the same time it is also striking to note that important disease control practice like keeping sick animals in isolation from the healthy animals was not at all adopted by majority (55.00%) of the dairy farmers. The present finding is supported by Yadav and Yadav (1995) and Gour (2002).

Some of the marketing practice like purchasing of animals from reliable sources after following scientific method of scoring/weightage on production was adopted by (41.67%) of the dairy farmer. While, nearly half (48.33%) of them had not adopted proper purchasing procedure of animals after veterinary check up. Other important practice like obtaining loans from nationalised banks instead of private money lender to purchase inputs for dairy farming was continuously adopted by majority (63.34%) of dairy farmers. Half (50.00%) of them were continuously adopting systematic procedure of selling of animals with necessary records of milk production, parity, service period and vaccination. This finding is in conformity with this result of Meena *et al.* (2017) and Gour (2002).

A glance of Table 3 and depicted that majority (58.33%) of the respondents had medium level of adoption of improved animal husbandry practices while, 26.67 per cent percentage of respondents were found to have high level of adoption of improved animal husbandry practices and only 15.00 per cent percentage of respondents were found to have low level of adoption of improved animal

Table 2: Distribution of the dairy farmers according to extent of adoption regarding various practices

S.No.	Practices	RA	SA	NA	Total
Reproduction practices					
1	Artificial Insemination done at proper time of heat, with semen of good bull	96(80.00)	11(09.17)	13(10.83)	120(100.00)
2	Having the crossbred cow served within 60 to 90 days after calving and for indigenous cow/buffalo – 90 to 100 days after calving	0(0.00)	0(0.00)	120(100.00)	120(100.00)
3	Having pregnancy diagnosis done between 60 to 90 days after service	81(67.50)	15(12.50)	24(20.00)	120(100.00)
4	Treatment of repeat breeders, mastitis, endometritis and anoestrus cases by a veterinarian	88(73.33)	13(10.83)	19(15.83)	120(100.00)
Nutritional practices					
1	Feeding of colostrums to newborn calves within half an hour of birth	94(78.33)	11(09.17)	15(12.50)	120(100.00)
2	Feeding of chopped fodders and balanced concentrate mixture with supplementation of min. mixture on the basis of milk production	82(68.33)	20(16.67)	18(15.00)	120(100.00)
3	Provision of ad lib clean and fresh water to animals	102(85.00)	12(10.00)	06(05.00)	120(100.00)
4	Use of HYVs of fodder seeds	62(51.67)	22(18.33)	36(30.00)	120(100.00)
Management practices					
1	Washing of hands and udder before milking	114(96.67)	3(02.50)	1(00.83)	120(100.00)
2	Maintenance of cleanliness during milking and comfort in animal houses/sheds (cleaning of manger and removal of dung daily) and good ventilation	109(90.83)	4(03.33)	7(05.83)	120(100.00)
3	Use of sterilized scissors/knife for cutting naval cord and application of tincture iodine on the naval cord/painting of naval cord	75(62.50)	25(20.83)	20(16.67)	120(100.00)
4	Full hand method of milking	98(81.67)	13(10.83)	09(07.50)	120(100.00)
Disease control practices					
1	Timely and regular vaccination against common contagious diseases, such as FMD and HS/BQ.	90(75.00)	16(13.33)	14(11.67)	120(100.00)
2	Prompt reporting of outbreak of a contagious disease to the local veterinarian	92(76.67)	18(15.00)	10(08.33)	120(100.00)
3	Timely treatment of sick animals by veterinary doctor	89(74.17)	19(15.33)	12(10.00)	120(100.00)
4	Isolation of sick animals from the healthy ones in a separate house/shed/ place	54(45.00)	0(0.00)	66(55.00)	200(100.00)
Marketing practices					
1	Purchasing animals from reliable source, after done scoring / weightage on production	50(41.67)	24(20.00)	46(38.33)	120(100.00)
2	Purchasing animals after veterinary check up	42(35.00)	20(16.67)	58(48.33)	120(100.00)
3	Obtaining loans from nationalized banks instead of village money lender	76(63.34)	10(08.33)	34(28.33)	120(100.00)
4	Sale of animals with necessary record of milk production, parity, service period and vaccination etc.	60(50.00)	11(09.17)	49(40.83)	120(100.00)

RA = Regular Adoption, SA = Sometimes Adopted, NA = Not Adopted (Figures in parenthesis indicate the percentage)

Table 3: Distribution of the dairy farmers according to their overall adoption regarding improved animal husbandry practices (n=120)

Categories	Frequency	Percentage
Low (< 3.63 score)	18	15.00
Medium (between 3.63 to 6.21 score)	70	58.33
High (> 6.21 score)	32	26.67
Total	120	100

Mean ($\bar{x}$) = 4.92 SD = 1.29

husbandry. The probable reasons might be due to the economic condition and staffing of positivism in terms of change agency contact, scientific orientation, risk orientation, knowledge and ICT exposure up to desired level. The finding is in agreement with findings of Chaurasiya *et al.* (2016); Rakshe *et al.* (1998) and Gour (2002).

It may be concluded that more than half (61.67%) of the milk producers had medium level of knowledge regarding improved animal husbandry practices. Slightly more than half (58.33%) of the milk producer had medium level of adoption of improved animal husbandry practices.

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Research Note

Ecological, Economical and Social Sustainability of Organic Farming

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ABSTRACT

The study was conducted in Bengaluru rural and Chikballapur district of southern Karnataka to assess the sustainability of organic farming. Data were collected from 120 organic farmers. *Ex post facto* research design was employed for the study. More than 47 per cent of the respondents opined that organic farming was highly sustainable. With respect to ecological sustainability of organic farming, 47.50 per cent of respondents observed that organic farming was highly sustainable whereas economical sustainability of organic farming was stated by 52.50 per cent of respondents. More than 47 per cent of organic farmers considered organic farming socially sustainable.

Keywords: Ecological sustainability, Economical sustainability, Organic farming, Social sustainability

INTRODUCTION

Rapid changes in economic, technical and demographic conditions have brought in increasingly more number of small holder farming systems in to focus. The need based research and field extension work have focused on modern agriculture with higher use of external inputs, like agro-chemicals, hybrid seeds, fuel based mechanization, etc. The primary aim of their efforts has been to increase the yields of targeted crops. In the process of attaining higher levels of food production to keep pace with population growth during the past four decades, emphasis was laid on intensive agricultural practices. Though, India has become self-sufficient in food production, it has resulted in serious environmental degradation and health hazards to mankind, animals and the biodiversity. This has also sometimes resulted in lower returns to the farmers due to a glut in the market. It is emphasized that technologies generated over the past four decades were not in tune with the natural resource base and environment in different parts of globe. The gravity of environmental degradation has motivated scientists and

planners towards finding out eco-friendly, economically feasible and sustainable farming systems for different agro-climatic conditions, emphasizing the needs of present and future generations. Hence organic farming was found to be the real time solution to combat the above mentioned problems. Organic agriculture is a holistic production management system which promote the health of agro-ecosystem including biodiversity, biological cycles and soil biological activities. Researches show that organic production system have its impacts in all aspects of the cultivation including the nature and mind set of people, who were considering farming as their life supporting and income source. It allowed the adoption of traditional and indigenous knowledge like farmer selection varieties and management practices and incorporation of biological principles and resources for intensification of production. By adopting organic cultivation, farmers are challenged to take on new knowledge and perspective and to innovate (Gills *et al.*, 2013). This is achieved by employing agronomical, biological and mechanical methods without using synthetic materials. There is huge discussion about whether organic farming is sustainable or not, whether it

should be promoted or otherwise, and what is the opinion of the farmers about sustainability of organic farming? With this brief background it was felt necessary to carry out the research study to assess the sustainability of organic farming.

METHODOLOGY

The research was carried out in Bengaluru rural and Chickballapur district of Karnataka state. Bengaluru urban comprises four taluks viz; Devanahalli, Doddaballapur, Hosakote and Nelamangala. Chickballapur district include six taluks viz., Gouribidanur, Bagepalli, Gudibanda, Chickballapur, Sidlaghatta and Chintamani. Four organic farmers' associations were selected from each district and from each association, fifteen organic farmers were selected. Thus from both districts, 120 organic farmers were selected as sample for the study. *Ex-post-facto* research design was employed for the study. To measure the sustainability of organic farming, tool was developed and standardized consisting of 34 items. The response was collected on a five point continuum viz; strongly agree, agree, undecided, disagree and strongly disagree with assigned score of 5, 4, 3, 2, and 1, respectively for positive statements and reverse scoring for negative statements. Data were collected through personal interview method and data collected was analyzed using appropriate statistical tools like frequency, percentage, mean and standard deviation.

RESULTS AND DISCUSSION

It is observed from Table 1 that three components were identified to assess the sustainability of organic farming. Under each component, items were developed. Ecological sustainability component consisted of 20 items whereas seven items each were under economic and social sustainability components.

Item wise Sustainability of organic farming practices

Five items that got highest mean score were organic farming improves flora and fauna (1st rank), organic farming protects and recharges farm resources in your field (2nd rank), organic farming increases biodiversity (3rd rank), organic farming leads to resurgence of pest and diseases (negative statement) (4th rank) and

indigenous knowledge is recognized (5th rank). Incidentally among these items, first, second, third and fourth items belonged to ecological sustainability component and fifth item belonged to social sustainability component. It may be due to high level of farming experience, mass media exposure extension participation, innovativeness and social participation. These characteristics play a very important role in development of individual personality and defining cognitive demand of individual (Chahal *et al.*, 2014). Further the above characteristics improve the cognitive and affective domain of the organic farmers leading to adoption of organic farming practices which in turn leads to sustainability of organic farming. Five items that got least mean score were organic farming improves soil productivity (34th rank), organic farming reduces water pollution (33th rank), it conserves and preserves environment (32nd rank), it enables availability of high quality food at reasonable price (31st rank) and it leads to healthy atmosphere (30th rank). Among above items, first, second and third item belonged to ecological sustainability component, fourth item is related to economical sustainability component and fifth item belonged to social sustainability component.

The above results remind the concept of direct and indirect consequences of innovation (Rogers, 1983). Some consequences of organic farming are direct and some are indirect. Most of the organic farmers have observed and realized the direct benefits of organic farming but failed to realize the indirect benefits of organic farming like role played by organic farming in improving soil productivity by increasing the soil microbial activity, reducing water pollution by eliminating the usage of chemical fertilizers which on usage leads to water pollution, conserves and preserve environment by usage of eco-friendly technologies in agriculture. The above reasons can be attributed to the above trend of findings. With respect to ecological sustainability, the items that were agreed by most of the respondents were that organic farming improves flora and fauna (1st rank), organic farming protects and recharges farm resources in the field (2nd rank), organic farming increases biodiversity (3rd rank). The items that got least score are organic farming improve soil productivity (20th rank), organic

Table 1: Item wise sustainability of organic farming

S.No.	Statements	Mean	Rank under each component	Overall rank
Ecological Sustainability				
1	Organic farming protects and recharges farm resources in your field	4.3	2	2
2	Organic farming increases biodiversity	4.24	3	3
3	Organic farming have negative impact on environment	3.89	12	15
4	It leads to chemical free environment	4.05	6	7
5	It reduces Soil erosion	3.7	17	24
6	Sustains soil fertility through organic cycling	3.97	8	11
7	It maintains balance in eco system	3.90	11	14
8	It leads to resurgence of pest and diseases	4.19	4	4
9	It is eco friendly	3.97	8	11
10	Improves flora and fauna	4.42	1	1
11	Organic farming conserves natural resources	3.84	14	19
12	Organic farming promotes soil microbial activity	3.97	8	11
13	Conserves natural enemies	3.74	16	23
14	Due to usage of organic matter it improves soil porosity	3.88	13	16
15	Organic farming reduces water holding capacity of soil	4.06	5	6
16	Organic farming improves organic content in the soil	3.98	7	10
17	Organic farming improves water use efficiency	3.78	15	21
18	Organic farming reduces water pollution	3.12	19	33
19	It improves soil productivity	2.87	20	34
20	It conserves and preserves environment	3.32	18	32
Economical Sustainability				
1	Reduces cost of production	3.61	6	29
2	It enables availability of high quality food at reasonable price	3.50	7	31
3	Help farmer to become self-sufficient with minimal risk in long run	4.05	1	7
4	There is huge demand for organic products	3.67	4	25
5	Organic products fetches better prices to farmers	3.85	2	18
6	Organic farming leads to optimum utilization of resources	3.65	5	27
7	Increases dependency of external inputs	3.78	3	21
Social Sustainability				
1	Indigenous knowledge is recognized	4.14	1	5
2	Produces safety and nutritious food	3.86	3	17
3	Technology safer to human and animals	4.05	2	7
4	Organic farming benefits both producers and consumers	3.65	6	27
5	Organic farming will sustain the health of soil, plant animal and human	3.84	4	19
6	It leads to healthy atmosphere	3.6	7	30
7	It is self-sustaining	3.67	5	25

farming reduces water pollution (19th rank) and organic farming conserves and preserves environment (18th rank).

When economic sustainability is concerned, the items that got highest mean score were organic farming help farmer to become self-sufficient with minimal risk in long run (1st rank), organic products fetches better prices to farmers (2nd rank). Items that got least mean score were that organic farming enables availability of high quality food at reasonable price (7th rank) and it reduces the cost of production (6th rank). Further in case of social sustainability, indigenous knowledge is recognized got highest mean score and bagged first rank followed by technology safer to human and animals (2nd rank). Items organic farming leads to healthy atmosphere and organic farming benefits both producers and consumers got least mean score and bagged seventh and sixth rank, respectively.

Sustainability of organic farming on three pillars

Regarding ecological sustainability of organic farming, it was found that 47.50 per cent of respondents responded that organic farming is highly sustainable followed by less sustainable (28.33%) and sustainable

(24.16%). Mean score and standard deviation values obtained for ecological sustainability were 77.25 and 14.07 respectively. Adoption of organic farming practices along with their farming experience have made farmers to realize the benefits of organic farming like improving in flora and fauna, conserving and recharging the farm sources, avoidance of resurgence of pest and diseases, improving the organic content of the soil, improving microbial activity in soil and improving water holding capacity of soil. All the above reasons may be attributed to the above trend of findings.

It can be noticed that 52.50 per cent of respondents felt that organic farming is sustainable followed by highly sustainable (30.00%) and less sustainable (17.50%). Mean score and standard deviation values obtained for economical sustainability were 26.14 and 4.73 respectively. It can be inferred that 82.50 per cent of the organic farmers' perception belonged to economically sustainable to highly sustainable category. It may be due the fact that the organic farmers with their high level of experience in farming perceive that organic farming help farmer to become self-sufficient with minimal risk in long run, organic products fetches better price for them, decreases dependency on external inputs and there by

Table 2: Sustainability of organic farming on three pillars

Category	Criterion Score	Frequency	Per cent	Mean	SD
Ecological sustainability					
Less Sustainable	< 70.21	34	28.33	77.25	14.07
Sustainable	70.21- 84.29	29	24.16		
Highly Sustainable	> 84.29	57	47.50		
Economical sustainability					
Less Sustainable	< 23.77	21	17.50	26.14	4.73
Sustainable	23.77- 28.50	63	52.50		
Highly Sustainable	>28.50	36	30.00		
Social sustainability					
Less Sustainable	< 24.60	29	24.16	26.83	4.46
Sustainable	24.60-29.06	34	28.33		
Highly Sustainable	> 29.06	57	47.50		
Overall sustainability					
Less Sustainable	< 118.78	35	29.16	130.23	22.87
Sustainable	118.78- 141.68	28	23.33		
Highly Sustainable	> 141.68	57	47.50		

reduces the cost of cultivation. Also the promotional efforts of department of agriculture in the state through implementation of organic farming policy 2017 which provides good marketing linkages for the organic farmers have resulted in above trend of findings.

In case of social sustainability of organic farming, 47.50 per cent of organic farmers considered organic farming as highly sustainable, 28.33 per cent of organic farmers considered organic farming as sustainable and 24.16 per cent perceived organic farming as less sustainable. Mean and standard deviation values obtained for social sustainability were 26.83 and 4.46 respectively. It may be due to the fact that the organic farmers have high level of adoption of organic farming practices leading to development of favorable attitude towards organic farming. Further their experience in organic farming have made them realize the benefits of organic farming like recognition of indigenous technical knowledge, technology used in organic farming is safe for humans and animals, produces safety and chemical free food and will sustain the health of soil, plant, animal and human being.

In overall, it can be observed that 47.50 per cent of organic farmers belonged to category which found organic farming highly sustainable, while 29.16 and 23.33 per cent belonged to the category which stated that organic farming as less sustainable and sustainable, respectively. The ground reason for the above trend of findings is due to high level of farming experience and adoption level of organic farming practices. When the farmers gain more experience in organic farming, they tend to adopt the organic farming practices and also their experience would have realized the importance of different facets of organic farming sustainability like ecological, economic and social sustainability.

CONCLUSION

It can be inferred from the results that there was similar trend of results with respect to ecological and social sustainability of organic farming where nearly half of the organic farmers (47.50%) perceive organic farming is ecologically and socially sustainable. While economical sustainability of organic farming is concerned, only 30.00 per cent of the organic farmers perceived that organic

farming is economically sustainable. Major reason for this finding is because of improper marketing linkages for organic produce due to which the organic farmers are not deriving the good price for their organic produce. Hence the study draws the attention of the concerned agencies to develop proper marketing linkages which would yield good price to the organic farmers. Collaborative or group approach of organic farmers would help the farmers. Further the registered exclusive organic outlets should be linked to the organic farmers associations which would avoid lot of market intermediaries.

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Research Note

Extent of Volunteering Work on School Vegetable Garden by Students and Teachers

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ABSTRACT

India is the second largest producer of vegetables in the world, our productivity levels are abysmally low. Agricultural activities have produced a variety of educational benefits in primary school students. It has deepened the recognition of the importance of feeling nature, enhanced the ability of self-control and widened the understanding toward work. At disabled children's schools and in classes of disabled children, agricultural activities have immensely contributed to the development of these children, academically and socio psychologically. It is a living laboratory where lessons are drawn from real-life experiences rather than textbook examples, allowing students to become active participants in the learning process. Extent of volunteering for students and teachers were measured in terms of their involvement in school vegetable gardening and was expressed as hours per week.

Keywords: Vegetables garden, Volunteering work, School

INTRODUCTION

The school vegetable garden movement originated in Europe and got widely popularized in United States in the 1890s. Vegetable gardens skimmed up at schools all over the country during the early 20th century, more recently, the popularity of school gardens as an educational tool steadily grew as a way to teach healthy eating behaviours and increase hands-on learning experiences in inter or multi disciplinary lessons.

Vegetables are an important source of food and nutrition. Vegetable production constitutes roughly two-third of the total production of horticulture crops. Although India is the second largest producer of vegetables in the world, our productivity levels are appallingly low. In case of Kerala, more than 70 per cent of our vegetable requirement is met from our neighbouring states like Tamil Nadu, Karnataka and Andhra Pradesh. Kerala also has

the limitation of land for agriculture owing to the high rate of fragmentation of land due to population pressure, increasing nucleotide family structure, and other demographic positioning (Thomas, 2004). One best way to address the issue of vegetable shortage is to scale up its production in schools using the vast acre of under or unused lands and the immense young energy. To address this, many projects have been initiated by Kerala Government. Vegetable and Fruits Promotion Council Kerala (VFPCCK) plans to develop vegetable gardens in 1,000 schools within three months as part of its agri@schoolprogramme aimed at cultivating interest in agriculture among school children. The concept is 'A Vegetable Garden in my school' for children, said a press release from VFPCCK. The area covered by the vegetable gardens will be determined by the availability of land. According to estimates, between two and 15 cents of land targeted to be used for vegetable gardens in schools.

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It is estimated that 600 tons of vegetables can be produced from the 1,000 gardens in schools (The Hindu, 2006).

METHODOLOGY

Ten best performing schools in vegetable gardening were purposively selected in consultation with the officials of Directorate of Public Instruction (DPI) of Thiruvananthapuram district. Ten active volunteers who were participating in the school vegetable gardening activities were selected at random from 10 schools after consulting with the respective school teachers. Thus a total of 30 teacher respondents were selected for the study. Extent of volunteering in this study refers to how often the respondents volunteered work for community service with or without relation to school. Extent of volunteering in this study for students and teachers were measured in terms of their involvement in school vegetable gardening and expressed as hours per week. The respondents were grouped into different category viz., high and low with weighted mean values as a measure of check.

RESULTS AND DISCUSSION

Extent of volunteering for students and teachers were measured in terms of their involvement in school vegetable

gardening and was expressed as hours per week. The respondents (students and teachers) were grouped into different category and the results are presented in the Table 1, 2 and 3. From perusal of the Table 1, it is observed that 60 per cent of the students and teachers belonged to high level of 'extent of volunteering' work inside the school, with special reference to school vegetable gardening and 40 per cent of the students and teachers belonged to low level of 'extent of volunteering' work inside the school. It was interesting to note the same distribution in case of extent of volunteering (work in school). Apart from extent of volunteering work in school, observations were recorded for 'number of days' per week of involvement of students in school gardening activities and the results are given in Table 2. The result of the study showed that 70 per cent of school involved

Table 2: Distribution of students according to their number of days involved per week (n=10)

No. of days/week	Frequency	Percentage
2 days	2 school	20.00
3 days	7 school	70.00
4 days	1 school	10.00
Total	10 school	100.00

Table 1: Distribution of students and teachers according to their extent of volunteering (work in school) (n -130)

Category (hours/week)	Students (n=100)		Teachers (n=30)	
	Frequency	Percentage	Frequency	Percentage
High	60	60.00	18	60.00
Low	40	40.00	12	40.00
Weighted mean	165 min/week		165 min/week	
Lower value	120 min/week		120 min/week	
Higher value	240 min/week		240 min/week	

Table 3: Distribution of students and teachers according to their extent of volunteering (work out of school) (n=130)

Category (hours/week)	Students (n=100)		Teachers (n=30)	
	Frequency	Percentage	Frequency	Percentage
High	18	18.00	19	63.33
Low	82	82.00	11	36.67
Weighted mean	64.8 min/week		174 min/week	
Lower value	30 min/week		60 min/week	
Higher value	120 min/week		240 min/week	

in 3 days per week voluntarily in school vegetable gardening activities followed by 20 per cent of school involving in 2 days per week and 10 per cent involving in 4 days per week. Therefore, it was concluded that majority of the students voluntarily worked 3 days per week in school vegetable garden. Also, it can be interpreted as majority of the schools (70%) has planned school vegetable gardening for 3 days per week.

From Table 3 it was identified that extent of volunteering of school students was low (82%) for work outside the school in vegetable gardening whereas 63.33 per cent of the teachers fell in the category of 'high level of volunteering work' outside the school with reference to vegetable gardening activities. The results are even more interesting, that the weighted mean of 'extent of volunteering' (work out of school) demonstrated that teachers were involved in vegetable gardening for 174 min/week as against students who were involved for 64.8 minutes/ week. This could be due to the voluntary participation of teachers in their respective home garden for safe food and nutritional requirements and also with the urge for deriving additional income through agricultural activities. The results are similar to the findings of the study done by Benson *et al.* (1999).

CONCLUSION

Majority of the students and teachers (60.0%) had high level of extent of volunteering work inside school however, in the case of extent of volunteering work outside school, majority of the students (82.0%) belonged to the low category. More than 63.33 per cent of teachers had high level of extent of volunteering work outside school.

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Research Note

Empowerment Level of Employed Women in Decision Making

Priyanka^{1*}, Adline Shanta Tigga² and Monika Kumari³

ABSTRACT

Empowerment of women has been recognized as a central issue in determining the status of women. The role of employed women has changed throughout the country and the world due to economic conditions and social demands. Employed women have tremendous pressure to develop their career as robust as their male counterparts while sustaining active engagement in personal life. Economic empowerment is the capacity of women to participate in, contribute to and benefit from growth process in ways which recognise the value of their contribution, respect their dignity and make it possible to negotiate a fairer distribution of the benefits of growth. Employment empowers women by providing financial independence, alternative source of social identity and exposure to power structures. In the economic sphere, paid employment is seen as essential to women's empowerment which focuses on access to employment opportunities and working conditions at work place and at community level, and on a woman's decision making power freedom of movement, control over resources and contribution to total family earnings in the household. This paper is an attempt to know the extent of empowerment of employed women. It was measured by four indicators of women empowerment. It was found that empowerment of employed women was in medium level under empowerment index. It concluded that there are number of structural barriers which limit the extent of empowerment.

Keywords: Employment, Empowerment, Economic empowerment

INTRODUCTION

Women are generally denied the ownership of property and control over assets, the ability to earn outside income can become an important instrument for the transformation of gender relations and challenge many traditional modes of social and economic relations (UNESCAP Report, 1999). Empowerment of women has been recognized as a central issue in determining the status of women. Empowerment covers aspects such as women's control over material and intellectual resources. Empowerment is a process, not an event, which challenges traditional power equations and relations. Abolition of gender-based discrimination in all institutions and structures of the society and participation of women in policy and decision-making processes at domestic and public levels are few dimensions of women

empowerment. Empowerment of women is a two-way process in which we empower and get empowered in turn. This may be broadly defined as control over material assets, intellectual resources and ideology. Women's empowerment in India principally aims at enhancing their social functioning by a quantitative and qualitative change, particularly in the field of educating health and employment. Redistribution of social power and a change in the control of resources in favour of women in any society is not possible unless they are healthy, educated and provided with some gainful employment opportunities (Goswami, 2013). Empowerment of women consist of greater access to knowledge and resources, greater autonomy in decision making to enable them to have greater ability to plan their lives, or to have greater control over the circumstances that influence their lives and free from shocks imposed on them by custom, belief and

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practice (GU, 2005). Research on women's status in developing countries reports widespread inequality between the genders. Inequality between women and men takes the form of economic inequality as well as differentials in education, health care, rights and access to a number of essential resources and differences in power in all spheres of life. Women's empowerment in terms of the ability to exercise control over their lives, control over their labor, freedom to move and interact, access to leadership position and control over reproduction (Rajagopalan, 2002).

Employment can be an important source of empowerment for women, particularly for cash and in the formal sector. Employment empowers women by providing financial independence, alternative source of social identity and exposure to power structures. It makes one confident in mastering the job situation and increases competence, i.e. better skill in performing a given task or a number of tasks. It makes one independent because confidence, competence and awareness makes one to decide on one's judgment, and finally, it makes one critical, to ask and raise questions, able to make differences between what is right and what is not wrong. Economic empowerment of women is the key to gender equality and well being of a nation. This would not only enhance women's capacity of decision making but also lead to reduction in corruption, armed conflict and violence against females in the long run (Blumberg, 2005). Women's household decision-making and freedom of movement are often used as indicators of women's empowerment. The ability to make decisions that affect one's life and the ability to move beyond the sphere of the home freely exemplify autonomy and were quickly adopted as basics to empowerment. Other aspects of women's lives have become important to empowerment as the concept has expanded to encompass power in a number of spheres and forms. When there are positive impacts on empowerment and market activity affects women's ability to influence resource allocation and domestic decision-making (Acharya *et al.*, 1983), drastic changes in women's empowerment as a result of employment are limited. It is argued that simply being employed is probably not enough to ensure women's empowerment because working does not necessarily

allow women to challenge the power structures that prevent their agency and full participation in society.

METHODOLOGY

The study was carried out in Sabour block of Bhagalpur district in Bihar during 2017. The selection of this particular block was made purposively due to the availability of five types of respondents; Assistant Professor, Doctors, Nurses, Teachers, Bankers and then five types of respondent were employed in agriculture colleges, schools, banks, hospitals in Sabour block. The random sampling procedure was adopted to select the respondents for the study. A sampling frame of married employed women was prepared for the study by visiting the different government sectors (*i.e.* Schools, colleges, banks and a hospital) of employed women. A sample of 100 married employed women was selected randomly. Since the focus of the study was to find out the empowerment of the employed women, the study includes only the married women with the assumption that they face more problems than unmarried employed women. Empowerment of employed women was measured by four indicators *i.e.* decision making, freedom of movement, control over resources and views on violence against women.

RESULT AND DISCUSSION

To explore the changes in decision making pattern of women due to employment responses of the respondents were obtained under three categories: independently, jointly with husband, husband only. The results in Table 1 indicates that majority of respondents were taking independent decision regarding purchasing for self (62.00%) and purchasing daily household items (57.00%). Whereas decision regarding obtaining health care (82.00%), staying with family (91.00%), going for outings (83.00%), purchasing for children (65.00%), children education (57.00%), children marriage (95.00%), household expenditure (61.00%), house repair and construction (56.00%), and equal treatments for girls and boys in the family were taken jointly with husband. The present findings were in line with the findings of Hillenbrand (2012), who observed that two-thirds of women (65.00%) said that husbands alone made decisions about women's health care and 32.00 per cent alone made

Table 1: Decision making pattern of employed women

S.No.	Aspects	Independent (%)	Jointly with husband (%)	Husband only (%)
1.	Obtaining health care	17	82	1
2.	Staying with family	9	91	0
3.	Going for outings	17	83	0
4.	Purchasing for children	35	65	0
5.	Purchasing for self	62	37	1
6.	Purchasing daily household items	57	39	4
7.	Children's education	34	57	9
8.	Children's marriage	4	95	1
9.	Household expenditure	39	61	0
10.	House repair and construction	6	56	38
11.	Equal treatment for girls and boys in the family	8	92	0

Table 2: Categorization according to Level of decision making pattern of the respondents (n= 100)

S.No.	Category	Per cent
1.	Low (< 21.65)	13
2.	Medium (21.65-27.02)	81
3.	High (> 27.02)	6
Mean = 24.34 S.D = 2.68		

decisions about the child health care. Just 5.00 per cent of women said that they could solely control their own earnings and 5.00 per cent also said that they had independent say over other household decisions. Further it was found that women had least autonomy when it comes to make household purchases with less than 1.00 per cent of women claimed that they could make such decisions on their own.

Level of decision making pattern of the respondents was categories into low, medium, high on the basis of Mean $\pm$ S.D. The data depicted in Table 2 revealed that 81.00 per cent of respondents were found in the medium level of decision making followed by 13.00 per cent respondents were found in the low level of decision making and only 6.00 per cent respondents were found in high level of decision making. Haque *et al.* (2011) found the level of women empowerment in decision making (both economic and household) as satisfactory but the empowerment in physical movement was very low and overall empowerment level of women in Bangladesh was the least.

CONCLUSION

The level of decision making of the employed women was found medium (81.00%) it means there is still need of employed women to empower. It is clearly evident from the result that employment is important to empowerment and that women who work have a greater likelihood of higher empowerment than those women that do not, but that the strength of the relationship varies by empowerment indicator. We cannot forget that empowerment a state of being as well as state of mind and before full empowerment can be realized, women need to not only act differently, but to think differently, to value themselves more, and to really believe that they are equal. In order for employment to be more empowering the structural barriers to women's rights and equality must be addressed in the household, the community, the state, the nation and around the globe.

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