Volume 56, No. 2
April - June 2020

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Indian Journal of Extension Education

THE INDIAN SOCIETY OF EXTENSION EDUCATION
Division of Agricultural Extension, ICAR-Indian Agricultural Research Institute
New Delhi 110 012, Website : www.iseeindia.org.in

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INDIAN JOURNAL OF EXTENSION EDUCATION

Volume 56 **April-June, 2020** **No. 2**

CONTENTS

Research Articles

Research Notes

Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (1-9)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Health and Nutritional Status of Hill Farm Women of Mandi District, Himachal Pradesh

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ABSTRACT

Health and nutritional status of hill farm women selected from three blocks of Mandi District of Himachal Pradesh was assessed in the present investigation. Majority of selected farm women were in age group of 25-35 years and belonged to farm families having small to marginal land holdings. Mean height and weight of respondents was recorded below standards when compared at national level. Majority of farm women were of mesomorph body type (75%) followed by endomorphic (18.33). Physical fitness rating of the respondents showed that 48.33 per cent had high average rating followed by 18.33 per cent having good fitness. Assessment of nutritional deficiencies through clinical assessment revealed that majority of the respondents showed deficiency of iron and B complex vitamins. Less than 35 per cent women exhibited iron deficiency symptoms when assessed clinically. Comparison with suggested dietary intake revealed that the women had low intake for all food groups except sugar and oils. Their diets were inadequate in energy, protein, calcium, iron, B vitamins and ascorbic acid when compared with RDA.

Keywords: Body composition, Farm women, Food intake, Nutritional status, Physical fitness

INTRODUCTION

Nearly two-third of Indian population lives in the villages and depends mainly on agriculture and other related occupations for their livelihood. Women play a significant and crucial role in agricultural development and allied fields. Their contribution in agricultural labour force in developed countries is 36.7 per cent while, it is about 43.6 per cent in developing countries (FAO, 1999). It is estimated that women are responsible for 70 per cent of actual farm work and constitute up to 60 per cent of the farming population but, their role in agriculture has not yet been highlighted in India, so they still remain as invisible workers. Rural women often manage complex households and pursue multiple livelihood strategies. Irrespective of their degree of affluence, they provide 14-18 hr of productive physical labour every day in a wide variety of activities directly connected with agriculture, allied and domestic chores (Swarupa and Ashlesha, 2019). Their activities typically include producing agricultural crops, tending animals, processing and preparing food, working for wages in agricultural or other rural enterprises, collecting fuel and water, engaging in trade and marketing, caring for family members and maintaining their homes. Women as agricultural labourers participate in various agricultural activities like seeding, planting, weeding, irrigating, processing, harvesting and threshing operations. Hence, the physical strain of female farmers seems to be too high because of heavy work tasks of various activities done by them in agriculture

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and allied fields (Singh and Vinay, 2013). In Himachal Pradesh, women farmers are the veritable back-bone of subsistence agriculture because about 80 per cent of the field work in agriculture, from sowing to harvesting, post-harvest management and dairy management is done by hill women farmers. These women participate in extremely tedious, time consuming and labour intensive agricultural operations, viz land preparation, manuring, sowing, transplanting, weeding, hoeing, applying fertilizers, taking care of crops, harvesting and even post-harvest management like shelling, cleaning, grading, storage of food grains and processing etc. So, the role of this gender in agricultural and allied operations is very significant in the hill economy. Agriculture includes great amount of drudgery generally conceived as physical and mental strain, fatigue, monotony and hardship that compromise the health and well-being of farm women. The women also have to undergo a very hard life due to geo-physical conditions of the hilly region. The dominant features of hill farming in Himachal are small and marginal terraced and fragmented land holdings. Due to the undulating topography of region, farmers/farm women are still using traditional modes of cultivating crops. Lack of mechanisation add extra burden on the shoulders of women thereby increasing the drudgery level, affecting their nutritional status and health and reducing the productivity/output.

Health is fundamental to human progress. Nutrition is closely interlinked with health. A good nutritional status needs maintenance of health with a well-balanced diet and proportionate work. Pant (2002) in a study reported that an overwhelming population of hill women was in grip of severe to moderate malnutrition. Nutritional status as well as nutritional knowledge of hill women is unsatisfactory and needs interventions (Upadhyay *et al.*, 2011). Women's health status effect their productivity and their by their roles in society and their own development. Drudgery and low nutritional status of hill farm women is the most important reason for their undernourishment that makes them more prone to several diseases (Vats, 2006). Considering the multiple roles of agricultural women, the present study is an attempt to assess the health and nutritional status of hill farm women involved in agricultural work as well as allied activities.

METHODOLOGY

The baseline and the advanced survey were carried out in district Mandi of Himachal Pradesh. Sixty farm women who were performing agricultural and allied activities regularly were selected from three blocks viz. Chauntra, Mandi and Sundernnagar (twenty each) for the investigation. For carrying out the health and nutritional status of hill farm women, a well-structured questionnaire containing following aspects was developed. Pre-testing of questionnaire was done to make it more functional for final study. All the respondents were interviewed personally by the investigators at work spot, which enabled to get the first hand information.

Nutritional and health status of all the selected farm women was assessed by determining the intake of foods and nutrients information on different dietary aspects and dietary intake of women for three consecutive days using 24 hr. recall method. For this purpose, the respondent was asked which food items she consumed the whole day, from morning-tea to after-dinner. The food consumed was converted into their raw equivalents and the average daily intake of food and nutrients was calculated by using 'Diet Cal' software. The food and nutrient intake was compared with Suggested Dietary intake and Recommended Dietary Allowances (ICMR, 2010). The per cent diet and nutrient adequacy was also calculated. Height, weight and skinfold thickness of selected respondents were measured. Height measurement was taken with the help of an anthropometric stadiometer. The body weight was taken using portable weighing balance. The harpender skin fold caliper was used to measure skin fold thickness at four body sites. On basis of these parameters, body composition, body type and body mass index were calculated to assess the health status of farm women. Body Mass Index was calculated by using the following formula and was categorised as per classification given by WHO (2004).

$$\text{Body Mass Index (kg/m}^2\text{)} = \frac{\text{Weight, kg}}{\text{Height, m}^2}$$

Blood pressure was measured with digital blood pressure monitor. Physical fitness of respondents was

assessed using step-test exercise. Their resting and working heart rate while performing the exercise was measured with heart rate monitor (polar RS 400). Physical fitness Index (PFI) was calculated by using the following formula:

$$\text{Physical Fitness Index} = \frac{\text{Duration of stepping (sec.)}}{\text{Sum of } 1^{st}, 2^{nd} \text{ and } 3^{rd} \text{ min recovery heart rate}} \times 100$$

Aerobic Capacity was calculated by using formula as below.

$$(VO_2 \text{ ml / kg x min.}) = 0.377 \times \text{Step – stool test score (PFI)} – 12.767$$

Health status of the women as per their PFI scores and aerobic capacity were interpreted as given by Edward *et al.* (1973) and Anonymous (2000). The farm women were assessed for different nutritional deficiencies using clinical assessment method.

RESULTS AND DISCUSSION

Before assessing the health and nutritional status and compiling information on various aspects of respondents, a baseline survey of sixty selected farm women from three blocks of district Mandi was done to document their general profile in addition to recording of socio-economic indicators like land holding pattern, income, education and animals rearing pattern etc. The objective behind this, was to assess the quality of lifestyle of families and to study the influence of these demographic and socio economic factors on health and nutritional status of selected respondents.

The basic determinants of health and nutritional status of women are socioeconomic and cultural as well as education having a mediating or modifying influence on cultural practices (Obong *et al.*, 2001). General profile of farm women respondents is presented in Majority of women were in age group of 25-35 years (33.33%) living in a joint family system. Most of these farm families had small to marginal land holdings so 60 per cent of farmers reported insufficient produce from land. Regarding education, more than 40 per cent of women were below matric (46.66%) followed by education upto matric level (21.66%) while 23.33 per cent respondents were uneducated. Only four women studied upto senior secondary level and three were graduates. All the families had their own house with mean monthly income of Rs 17,000. Major *rabi* crops grown were wheat, potato and vegetables. During kharif season, vegetables, maize, paddy, and soybean were grown. Since, 83.33 per cent families owned milch animals, so fodder crops were grown in both seasons. Agriculture was the main occupation of the reported areas while horticulture was not done on commercial level. The horticulture crops grown were mostly their backyard plantations. Data on milch animals rearing pattern by selected farm women was also recorded and compiled. Hybrid bred cow was the main milching animal in Mandi area whose yield was only 5-10 lts/day. Besides, milching animals, other domestic animals like poultry (18.33%) and sheep were also domesticated.

Food/dietary pattern of selected farm women suggested that majority of them (86.66%) were occasional consumers (51.66%) of non-vegetarian foods. Three

Table 1: Food/dietary pattern of selected farm women

Particulars	Blocks			Total (N=60)
	Chauntra (n=20)	Mandi (n=20)	Sundernagar (n=20)	
Food habits				
Vegetarian	0	2	6	8(13.33)
Non-vegetarian	20	18	14	52(86.66)
Ovatarian	0	0	0	0
Frequency of non-vegetarian				
Once a week	0	0	0	0
Once in fortnight	6	1	2	9(15.00)
Once a month	0	8	4	12(20.00)
Occasionally	14	9	8	31(51.66)
Never	0	2	6	8(13.33)
Meal time				
Breakfast	20	20	20	60(100.00)
Mid- morning	20	20	20	60(100.00)
Lunch	20	20	20	60(100.00)
Evening tea	20	20	16	56(93.33)
Dinner	20	20	20	60(100.00)
After dinner	9	6	13	28(46.66)

Figures in parentheses represents percentage

square meals dominated the meal pattern however many of women were taking munch in between meals (Table 1). Nutritional status of an individual is assessed by anthropometry, which includes height, weight and other body measurements. The information on height throws light on the past nutritional status, that indicates how well-nourished they have been from the beginning. Body weight gives an indication of the current nutritional status to identify the individual as overweight, underweight or retarded growth. Bulkiness of an individual or body mass index is assessed by calculating the body weight and height so as to classify them into groups depending on their nutritional status. Anthropometric measurements although genetically determined, are strongly influenced by nutrition and reflect the pattern of growth and physical state of individuals. Farm women recorded mean height

Table 2: Anthropometry, skin fold thickness body type and BMI

Particulars	Blocks			Mean
	Chauntra (n=20)	Mandi (n=20)	Sundernagar (n=20)	(N=60)
Anthropometric				
Height (cm)	148.04±10.64	148.66±9.45	146.25±6.84	146.05±8.46
Weight (kg)	52.47±4.83	53.28±8.47	52.60±7.54	52.78±2.82
BMI (kg/m^2)	24.32±3.38	24.44±5.61	25.24±4.51	24.68±5.18
Skin fold thickness (mm)				
Biceps	9.64±2.54	10.27±2.87	8.73±2.87	9.55±1.97
Triceps	12.70±2.21	11.27±2.41	12.23±3.65	12.07±1.54
Subscapular	14.87±6.95	16.25±3.29	14.85±4.54	15.32±2.54
Suprailiac	16.37±2.84	15.45±4.51	15.43±5.62	15.75±1.54
Body type				
Ectomorph (<20)	1	1	0	2(3.33)
Mesomorph (20-25)	13	15	17	45(75.00)
Endomorph (>25)	4	4	3	11(18.33)
Body composition				
Body density	1.04±0.00	1.04±0.02	1.04±0.01	1.04±0.00
Per cent fat	27.46±2.50	27.32±5.84	26.90±2.05	27.22±1.90
Fat weight (kg)	17.09±3.12	16.09±3.51	14.26±2.51	15.82±1.57
Lean body mass (kg)	44.43±3.96	42.25±4.78	38.34±6.09	41.67±3.05
BMI (kg/m^2)				
Underweight (<18.5)	0	1	0	1(1.66)
Severe thinness (<14.00)	0	0	0	0
Moderate thinness (14.00-16.99)	0	0	0	0
Mild thinness (17.00-18.49)	0	1	0	1(1.66)
Normal (18.50-24.99)	11	12	13	36(60.00)
Over weight (25.00- 29.99)	5	6	3	14(23.33)
Obese (≥30.00)	4	2	4	10(16.66)
Obese I (30.00-34.99)	4	2	3	9(15.00)
Obese II (35.00- 39.99)	-	-	1	1(1.66)
Obese III (≥40.00)	-	-	-	-

Figures in parentheses represents percentage

of 146.05±8.46 cm and mean weight of 52.78±2.82 kg which were below standards when compared at national level (Table 2). This could be due to the type of food consumed by selected population because the food consumption influences to the greater extent on the nutritional status of population. BMI is a simple and useful index of relative weight applied to assess obesity or chronic energy deficiency. It provides a reasonable indication of the nutritional status of adults as well as indicator of health risks. Categorization of BMI derived from their height and weight suggested that 60% of farm women had normal nutrition (BMI-18.50-24.99) while 23.33 per cent of them were overweight (25.00-29.99) and 16.66% were obese (≥30.00). Their mean systolic and diastolic blood pressure was normal with average values of 122.67 and 78.42 Hg. The harpender skin fold caliper was used to measure skin fold thickness at four body sites which was calculated with average values of 9.55, 12.07, 15.32 and 15.75 mm at biceps, triceps, subscapular and suprailiac sites. Distribution of selected farm women on basis of body type, body composition and severity of malnutrition presented in Table 3 depicted that majority of farm women were of mesomorphic body type (75%) followed by endomorphic (18.33).

Agriculture is one of the important labour intensive activities, wherein maximum percentage of women works. They perform most of the tasks such as transplantation, weeding, harvesting etc, using their manual abilities of strength and fitness. Therefore, physical fitness of women is considered as an essential element for understanding her strength/vitality and sustainability of managing the work loads of farming. Physical fitness is primarily dependent on the functioning of the cardio – respiratory system and indicates the individual's status of health. Physical fitness rating of the respondents (Table 4) showed that 48.33 per cent had high average rating followed by 18.33 per cent having good fitness. Only 15 per cent had low average fitness. Aerobic capacity (VO_2 ml/kg-15 min) measured from heart rate values depicted that 30% had high average capacity (22.6-30.0) followed by 25% having low average capacity (<15) and 21.66 per cent having poor aerobic capacity (15-22.5).

Assessment of nutritional deficiencies of selected farm women through clinical assessment revealed that majority of the respondents showed deficiency of vitamins B_1 B_2 and B_3 as well as of vitamin C (Table 4). Less than

Table 3: Physical fitness rating and aerobic capacity

Particulars	Blocks			Mean
	Chauntra (n=20)	Mandi (n=20)	Sundernagar (n=20)	(N=60)
Physical fitness rating				
Excellent (>150)	1	0	2	3(5.00)
Very good (136-150)	4	2	1	7(11.66)
Good (116-135)	2	4	5	11(18.33)
High average (101-115)	8	10	11	29(48.33)
Low average (81-100)	4	4	1	9(15.00)
Poor (<80)	1	0	0	1(1.66)
Aerobic capacity (VO_2ml/kg 15 min.)				
Poor (<15)	3	6	4	13(21.66)
Low average (15-22.5)	6	4	5	15(25.00)
High average (22.6-30.0)	7	5	6	18(30.00)
Good (30.1-37.5)	2	3	4	9(15.00)
Very good (37.6-45.0)	1	2	1	4(6.66)
Excellent (>45.0)	1	0	0	1(1.66)

Figures in parentheses represents percentage

Table 4: Nutritional deficiencies among selected farm women

Particulars	Blocks			Mean
	Chauntra (n=20)	Mandi (n=20)	Sundernagar (n=20)	(N=60)
Protein Calorie Malnutrition				
Diminished subcutaneous fat	3	0	0	3(5.00)
Muscle wasting	0	0	2	2(3.33)
Oedema in ankles	0	5	5	10(16.66)
Vitamin A deficiency				
Night blindness	7	6	4	17(28.33)
Conjunctivalxerosis	10	1	3	14(23.33)
Bitot spot	3	8	9	20(33.33)
Vitamin D deficiency				
Knock knees or bow legs	11	6	9	26(43.33)
Thiamine deficiency				
Oedema	0	13	6	19(31.66)
Loss of ankle & knee jerks	6	14	6	26(43.33)
Calf-muscle tenderness	15	13	6	34(56.66)
Riboflavin deficiency				
Angular stomatitis	14	12	4	30(50.00)
Angular scars	14	6	3	23(38.33)
Cheilosis	14	7	3	24(40.00)
Magenta tongue	15	4	4	23(38.33)
Niacin deficiency				
Scarlet & raw tongue	11	14	15	40(66.66)
Atropic lingual papillae	0	17	16	33(55.00)
Tongue fissuring	0	4	4	8(13.33)
Vitamin C deficiency				
Spongy & bleeding gums	9	0	2	11(18.33)
Tender bone	1	17	17	35(58.33)
Easy fatigue and listlessness	12	17	20	49(81.66)
Iron deficiency				
Breathlessness on slight exertion	0	10	8	18(30.00)
Pale conjunctiva	12	0	6	18(30.00)
Paleness of skin	12	2	6	20(33.33)
Spoon shaped nails	8	0	6	14(23.33)
Feeling of lethargy/ Fatigue	6	0	4	10(16.66)
Weakness/ Dizziness	3	9	0	12(20.00)
Lack of concentration	5	10	1	16(26.66)
Decrease physical activity	0	0	0	0
Poor physical development	0	2	0	2(3.33)
Cold hand and feet	0	2	4	6(10.00)
Iodine deficiency				
Thyroid enlargement	-	-	-	-
Feeling of lethargy	-	-	-	-
Poor development	-	-	-	-

Figures in parentheses represents percentage

35 per cent women exhibited iron deficiency symptoms when assessed clinically. Further clinical assessment for iron deficiency anemia showed around 30 per cent of women having pale conjunctiva and breathlessness on slight exertion. More than 15 per cent respondents had feeling of lethargy/fatigue resulting in weakness and dizziness. No symptoms of iodine deficiency were present in the study group. Health ailment status revealed that 86.67 per cent suffered from backache followed by joint pain (71.67%), breathlessness (70.00%), body ache and headache (60% each). Women are more likely to suffer from nutritional deficiencies than men, for reasons including women's reproductive biology, low social status, poverty, and lack of education (Joshi *et al*., 2016). Socio-cultural traditions and disparities in household work patterns can also increase women's chances of being malnourished.

Good health is essential requirement throughout life and vital to women in terms of their daily activities. Women require proper nutrition for ensuring a healthy and long life. Nutritional surveys indicate large gaps in nutritional requirements and consumption among females as compared to males (Bellurkar, 2015). Diet composition plays an important role in nutritional status of an individual. A healthy and balanced diet, enriched with all the essential nutrients, is a must for overall well-being. Balanced diet must include food items from the various food groups in sufficient quantities to meet the needs of an individual and for maintenance of good health throughout the life. An ample and diverse supply of calories, protein, vitamin and minerals is necessary for good nutrition. Malnutrition and deficiency of these vital elements can lead to serious diseases and conditions and can affect the work efficiency. Comparison with suggested dietary intake revealed that the women had low intake for all food groups except sugar and oils. It was discouraging to know that a very low consumption of fruits and green leafy vegetables with per cent adequacy of 23.63 and 46.81 respectively was reported by respondents despite their accessibility to these foods in their kitchen garden/land. Many research studies (Jethi and Chandra, 2013; Mishra and Singh, 2017) have reported less consumption of pulses, green leafy vegetable, other vegetables and fruits than recommended levels among hill farm women. The food requirement of the people varies greatly depending on various factors. Apart from non-occupational activities like walking, eating, etc., the energy requirement changes depending upon the various activities that one has to perform in daily occupation such as agricultural activities, stone cutting, loading, etc. Mean daily nutrient intake and per cent adequacy of nutrients of selected farm women revealed that their diets were inadequate in various nutrients with more than 50 per cent adequacy for energy, protein, calcium, iron, B vitamins and ascorbic acid when compared with recommended dietary allowances. Energy is the main content of our food. Energy is essential for rest, activity and growth. Certain amount of energy is also expended by the body for respiration, blood circulation, digestion, absorption and excretion,

Table 5: Mean daily food intake and percent food adequacy of selected farm women

Food groups	SDI	Blocks			Total
(g per day)	(g/day)	Chauntra (n=20)	Mandi (n=20)	Sundernagar (n=20)	(N=60)
Cereals & millets	330	286.08±25.86 (86.69)	286.76±20.48 (86.89)	288.23±24.57 (87.34)	287.02±23.64 (86.97)
Pulses	75	58.70±12.50 (78.27)	58.49±10.19 (77.99)	60.17±8.92 (80.22)	59.12±10.54 (78.82)
Milk & milk products (ml)	300	250.57±63.23 (83.52)	206.48±50.16 (68.82)	231.54±54.38 (77.17)	229.53±55.92 (76.50)
Roots & tubers	200	151.11±22.60 (75.55)	143.82±42.08 (71.90)	150.61±34.72 (75.30)	148.51±33.13 (74.25)
Green leafy vegetables	100	46.98±18.67 (46.97)	46.30±11.83 (46.30)	47.18±13.72 (47.17)	46.82±14.74 (46.81)
Other vegetables	200	135.55±15.24 (67.77)	128.58±35.44 (64.29)	130.09±20.38 (65.04)	131.41±23.69 (65.70)
Fruits	100	24.26±7.61 (24.26)	23.39±13.00 (23.38)	23.26±10.37 (23.26)	23.64±10.32 (23.63)
Sugar	30	36.05±2.38 (120.15)	34.40±3.74 (114.65)	33.52±7.37 (111.74)	34.65±4.50 (115.51)
Oils	25	33.19±3.92 (132.76)	31.27±4.78 (125.08)	32.29±4.57 (129.17)	32.25±4.42 (129.00)

Values: Mean ± SD (Per cent adequacy), SDI- Suggested Dietary Intake

Table 6: Mean daily nutrient intake and percent adequacy of nutrients

Nutrients	RDA	Blocks			Mean
		Chauntra (n=20)	Mandi (n=20)	Sundernagar (n=20)	(N=60)
Energy (kcal/ day)	2730	2297.55±320.79(84.15)	2258.77±235.07(82.73)	2252.95±284.63(82.52)	2269.76±280.17 (83.14)
Protein(g/ day)	60	47.88±5.82(79.79)	51.86± 3.91(86.44)	50.82±5.20(84.69)	50.19± 4.97(83.64)
Fat (g/ day)	30	36.13± 3.14(120.44)	31.48± 5.82(104.94)	35.66± 4.23(118.86)	34.43± 4.40(114.75)
Calcium (mg/ day)	600	433.07±74.33 (72.17)	486.24±60.24 (81.03)	481.23±54.10 (80.20)	466.85±62.89 (77.80)
Iron (mg/ day)	17	13.28± 2.16(78.09)	14.18± 1.94(83.40)	15.58± 2.00(91.62)	14.34± 2.03(84.37)
Carotene (µg/ day)	4800	294.68±53.77 (6.13)	186.11± 72.31(3.877)	218.66±72.34 (4.55)	233.15±66.14 (4.85)
Vitamin B_1(mg/ day)	1.4	0.87±0.22(62.14)	0.79± 0.34(56.42)	0.89± 0.26(63.57)	0.85±0.27 (60.71)
Vitamin B_2(mg/ day)	1.6	1.03±0.22(64.47)	1.02± 1.23(64.03)	1.05± 018(65.52)	1.03± 0.21(64.67)
Niacin (mg/ day)	18	12.82±2.07(71.24)	11.77± 1.97(65.36)	12.76± 1.60(70.90)	12.45±1.88(69.17)
Ascorbic (mg/ day)	40	24.34±5.09(60.85)	26.22± 13.90(65.53)	21.32± 9.52(53.30)	23.96±9.50 (59.89)
Folate (µg/ day)	200	116.93±29.33 (58.46)	76.95± 27.08(38.47)	87.04± 31.63(43.52)	93.64±29.35 (46.82)
Mg (mg/ day)	340	129.09±23.71 (37.96)	142.56± 25.55(41.92)	140.30± 27.06(41.26)	137.32±25.44 (40.38)

Values: Mean ± SD (Percent adequacy), RDA- Recommended Dietary Intake

maintenance of body temperature etc. It is depicted from the table that energy consumption of the selected respondents ranged between 2252.95 to 2297.55 kcal, whereas average energy consumption of these respondents was 2269.76 kcal which is less than recommended intake. However, the respondents could attain more than 80 per cent of the energy adequacy. Low protein and energy intake below the recommended daily allowance (RDA) results in malnutrition and invariably low productivity. Less than 50 per cent adequacy was calculated for folate (46.82) and magnesium (40.38) and a very low adequacy of 4.85 for carotene. This may be due to low consumption of green leafy vegetables and fruits in their diets.

CONCLUSION

Agriculture is the vertical backbone of the country where women play a significant and crucial role in an array of farm activities. To do these heavy works, she needs to be physically fit and in good rating of health and nutritional status. In addition to these, social and cultural aspects also govern the extent of participation of women at the farm. Health is a basic need and a fundamental right of everyone and it assumes special significance in the case of women. Health and nutrition go hand in hand. Women's health and nutrition have a direct and strong repercussion on health status of the whole family, particularly their offspring. In the present study, it was indicated that the diets of women were nutrient deficient thereby affecting their physical work capacity leading to drudgery and health ailments. The reasons of insufficient nutritional status were lack of time, lack of awareness regarding importance of nutrition and health, over involvement in agriculture and allied chores and low self-esteem of women in the village society. In Himachal Pradesh, most of farmers are small and marginal having fragmented land holding pattern. Farmers/farm women are still using traditional modes of cultivating crops which are laborious, adds burden on the shoulders of women thereby increases the drudgery level, affecting their nutritional status and health and reducing the productivity/ output. So, the agricultural policies and programmes need to be more nutrition-sensitive to impact the health and productivity of families.

Paper received on : April 04, 2020
Accepted on : April 16, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (10-15)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

COVID 19- Response from Education System

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ABSTRACT

The world is facing numerous challenges caused by pandemic 'COVID-19, one of them is facilitating to continue education. Avoiding physical closeness is the prime solution for human being to be saved from it, which cannot be possible in traditional education system followed in India. Though MHRD is guiding academic institute to have online classes which itself has proved a challenge due to lack of resources, less technical knowledge among teachers and taught supported by poor internet connection. To get an understanding about online education in University of Rajasthan, Jaipur, the present study was undertaken with the objective to explore the present status and challenges of online teaching-learning system during lock down along with an understanding of precaution to be taken after lock down (from the students point of view). Data was collected through Google form and the results show that three fourth respondents feels that education system cannot afford lock down, online classes can effectively meet the need of the students and they are interested in having online classes, but student union elections are not in their priority. Students emphasised the importance of physical classes.

Keywords: Classes, Education system, Lockdown, Online classes, Physical distancing, Student union election

INTRODUCTION

In the global crisis of "Covid-19", most essential service like food, medical, electricity, education has been affected badly and education comes under the least prioritise service of the government and it's the last option which will government open when life will be normal so the option looked by government and other institutes for most essential but least attention given sector education is online education. Online education is electronically endorsing system which delivers study material along with interaction between teacher and student utilizing internet, proper amenities and ICT literacy. In developed countries like America, Russia, Europe etc. online education is not so new but in Indian society online education is a quiet not acceptable phenomenon over traditional method of education. India is in its early stage of online education where this method is yet adopted by early adopters only. There will be many hindrances in this abruptly implemented method-in its early stage of online education. Cost of internet pack is substantial which is not affordable for every student and also such apps like zoom, Skype, hangout, Google meet etc. require high bandwidth and strong internet connections. Table 1 shows the requirements of major online platforms.

An article of Hindustan times (2020), "IS E-LEARNING THE BEST BET DURING LOCKDOWN?" concluded that due to less accessibility of internet in rural as well as urban and lack of digital skills only higher class of urban in India are most likely seems to be ready for online learning. In an another article of The Print (2020), "WHY ONLINE CLASSES MAY NOT BE SUCH A GOOD IDEA AFTER ALL ESPECIALLY FOR KIDS" reported that many challenges faced by teachers like poor internet connection rural areas, requirement of high bandwidth connection for classes, lack of proper amenities like laptop, computer,

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Table 1:

Online platform	Group – lowest	Group- HD video 720p	Group – HD 1080p
Zoom (Computer)	0.8 Mbps up/ 1Mbps down	1.5 Mbps up/1.5 Mbps down	2.5 Mbps up/3 Mbps down
Zoom (on your mobile)	0.6 Mbps up/1.2 Mbps down	1.5 Mbps up/1.5 Mbps down	
Microsoft teams	0.5 Mbps up/ 1 Mbps down	1 Mbps up/2 Mbps down	
Google hangouts meet	2.6 Mbps up/2.6 Mbps down	3.2Mbps up/3.2 Mbps down	3.2 Mbps up/3.2 Mbps down
Skype	0.5 Mbps up/0.128 Mbps down	2 Mbps up/0.5 Mbps down	4 Mbps up/0.5 Mbps down

(*Source:* Business Insider South Africa, 2020)

smartphones etc., money for continuity in connections, struggling of teachers in coping up with technology, lack of instructions from institutes for online lectures and PPTs. Tiwari and Anjum (2013) showed that online education have many opportunities like it expand access to education, we can encounter faculty shortage through this, online education can improve quality of graduate, wide reachability, reduce physical infrastructure dependency, lower the costing, reduce geographical barriers, faster feedbacks, reduce male-female and urban-rural disparity, environment friendly, more understanding for learning material as they are in multi-media format. But at the same time it deals with challenges like requirement of proper training of ICTs, unfavourable attitude and motivation in faculty for enhancing quality of education, in many states computers are stolen or they are not being used, variation in implementation due to difference in policies of states, and lack of compatibility in learning material.

In this era of technology Indian society is still not aware of consciousness of online–teaching and learning supported by gender biasness in many of Indian families. Patriarchy and male dominant mind-set says "Smartphone are not for girls. Household work is more prioritized then online classes etc." Sangya Upadhyay who has been teaching Hindi in Girls College of Delhi University shared many messages of girls that why they are not able to attend online classes in her post. Many of these messages witness gender biasness and smell of patriarchy was there. These girls are very few girls mentioned by Sangya Upadgyay, there are many more girls who are not able to take online classes due to the same reasons. ICT enable person to manage and evaluate the information which is provided online. There can be many other hindrances also like- distraction during class, lack of silence, proper monitoring and evaluation of performance of student, lack of understanding between teacher and student, disturbance of family members during class, lack of knowledge of handling technology, lack of proper space in house for taking online classes and so on. The present study tried to explore the present status of online Teaching-learning system among students and to list out the challenges and required precautions (after lock down) for the effective teaching-learning.

METHODOLOGY

The study was conducted with the students of University of Rajasthan, Jaipur of Rajasthan, as this is the one of oldest and largest state University in the Indian state of Rajasthan situated in the capital, offering PG, SFS courses, Ph.D. and M.Phil. Programme. There are 5 constituents' colleges and 250 affiliated colleges in this University. More than 70 per cent students in this university belong to rural background. A Google form was developed with different section like personal information, awareness, opinion, challenges, and precautions etc. to check current status of online education in selected locale. This tool was circulated to students group through social media and whatspp group. 150 complete responses were analysed for purpose.

RESULTS AND DISCUSSION

The collected data on selected components are presented in four sections namely background, awareness and opinion about online classes, challenges faced and suggestive precautions after lockdown period.

Most the respondents (52%) were female doing PG degree in science faculty and perusing their degree in second semester. Jaipur was the second district of

Rajasthan to impose lockdown of 10 days even before the centre imposed lockdown. The sudden lockdown without any further notice and preparation resulted in disturbance of academics. As a solution online classes had been approached. The results shows that No prior preparation were done for online classes and students were not much aware of this concept but still good number (70%) of students were aware with UGCs' online learning and were interested in online classes (78%) with a belief that online classes would facilitate their learning. University declared summer vacation during this lock down but it was good to see that almost half of the teachers were taking online classes during breaks to facilitate students learning and utilizing this time period of lockdown. There are various platform which can be used for online teaching and learning recommended by university for online classes like Google-classroom, Google-hangout, Google meet, zoom, webinar, kahoot, G-suit etc. out of which most preferred platform was Google-classroom followed by zoom and Google meet as shown in Table 3. Except all these students also mentioned other platform used for online learning were WhatsApp and YouTube.

Table 2: Distribution of respondents according to their knowledge and skills regarding online learning (N=150)

Particulars	Percentage
Awareness with UGC online learning programme	70
Interested in online learning	78
Provision of Online classes provided by institute	48.7
Learning enhancement through online classes	74
Education system can afford prolong lock down	40.7

Table 2: Distribution of respondents on the basis of their knowledge regarding platform used for online classes

Platform used for online classes	Percentage
Google-classroom	36.7
Google hangout	0.7
Google meet	5.3
Zoom	13.3
Webinar	2.7
Kahoot	0
G suit	0
None	26.7
Other	14.6

Due to this unplanned lockdown students felt that many teachers and students were not having required infrastructure and skill for meeting together for online learning. Figure 3, itself shows that in the opinion of students, majority (84%) of teachers and students were in the category of efficient and semi efficient for online classes. Today we are living in a technical era so it's good to see that only 16 per cent of respondents consider that very few number of teachers' as well as students' lack efficiency to take online classes. Slowly and gradually the technology is overtaking in each sphere of life,

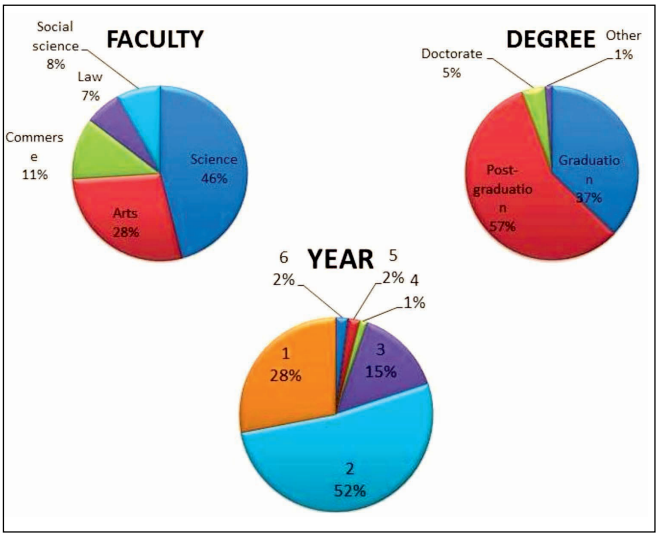

Figure 1: Background information of respondents (N=150)

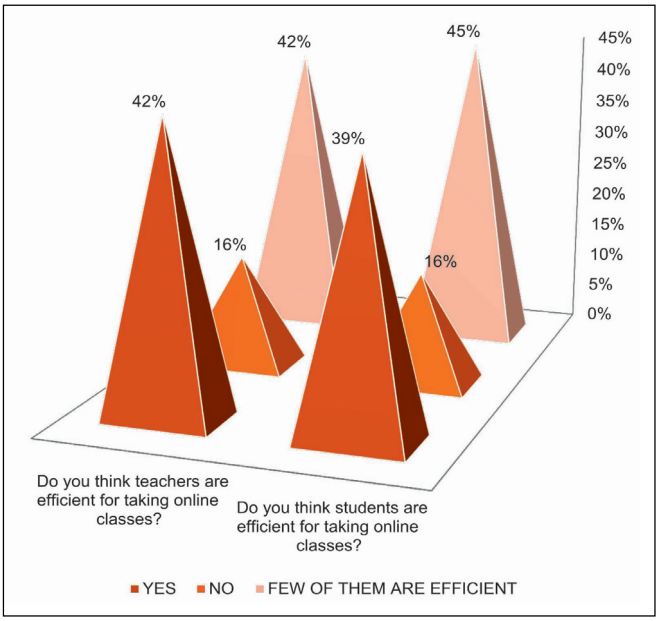

Figure 2: Distribution of respondents according to their opinion regarding efficiency of teachers' and students' in online learning

Table 3: Precautions to be taken by academic institute once the lockdown period over

Particulars	Number	Percentage
Classes in batches to maintain social distancing	110	73
Wearing mask should be mandatory	104	69
Monitor every students health timely (thermal checking)	88	59
All kind of events should be avoided in university to avoid gathering	87	58
Use of blackboard should be restricted in classrooms	50	33
Universities meetings should be virtual (online)	69	46
Arrangement of furniture should be proper to maintain physical distancing in classrooms	76	50
Sanitizer should be provided in every classrooms	96	64
In hostels, mess should run in batches to avoid gathering	79	52
Proper hygiene and precautions should be followed in hostels	83	55

education is not an exception. Now a day UGC is providing various platforms to facilitates learning of student, make learning more accessible for students like e-library and MOOCs. These are freely available to students and UGC continuously upload lectures, videos and study material on such platform from past 3 years and updating students through newspapers and its website, still after so many efforts one third of respondents are now aware of e-library (38%) and MOOC (36%).

Students were further asked to give their opinion on associated component of online learning viz., Online teaching can substitute classroom teaching in well and proper manner (1), After lockdown, University should give some time to students before conducting examination otherwise it will affect student's result Examination should be conducted soon after lockdown (2), This lock down will effect students' union election (3), Just after lockdown if examinations are conducted it will increase chances of "Covid-19" again (4) and Examination should be conducted just after lockdown (5), which are presented in Figure 4. Reponses made it clear that students didn't agree that online teaching can substitute regular teaching, they need some time for preparation before resuming to regular examination, also it may increase the chances of spread of disease so, the examination should not be conducted soon after lockdown period is over. It was also expressed that Lock down is going to effect the student union election. Normally, students get involved in election campaign from the examination and continue till election but for the coming

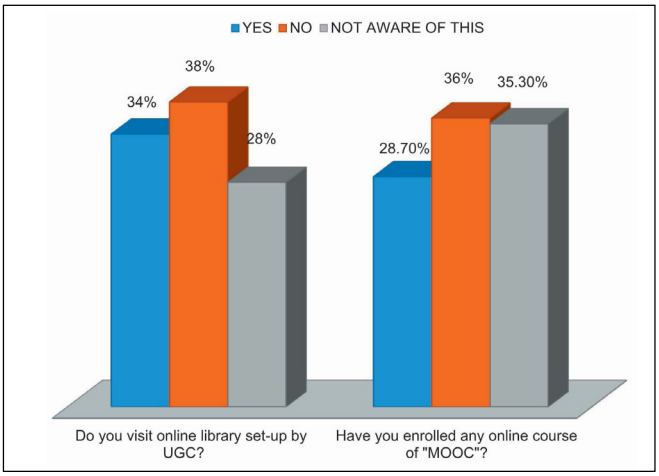

Figure 3: Distribution of respondents according to their knowledge regarding UGCs e-library and MOOC

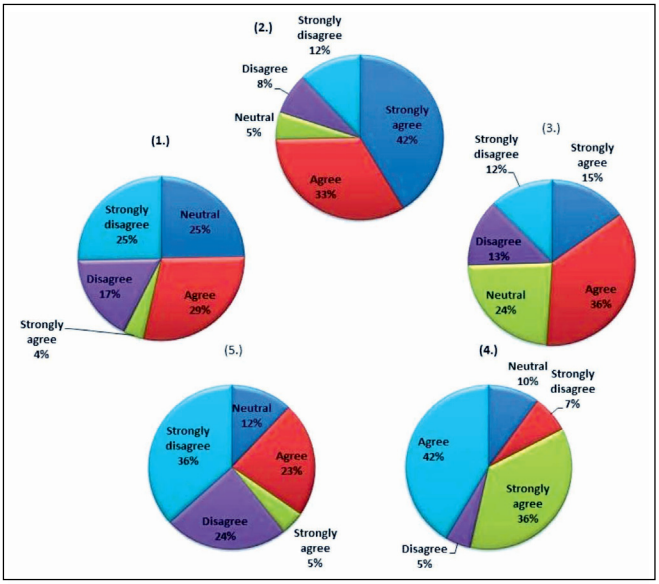

Figure 4: Opinion of students regarding associated component of online learning

academic session 2020-2021 the situation is different if students get involved in election campaign this may lead to crucial conditions of covid-19. As shown in Figure 5, 43 per cent respondents say no for election followed by delay in election (31%) till situation get back to normal. Some respondents (15%) said that there should be merit based election procedure as precaution and only 9 per cent agreed to election with 5 days' procedure using all precautions and 2% other said that there should be online procedure for voting as per precaution of "covid-19".

India is having the highest smart phone user in the world but in case of internet network not in the top countries which directly show that how difficult it is to use internet dependent technologies. According to few study only 24 per cent of Indians have access to smartphone it means one in every four Indian with poor mobile network. India is second largest in the world with internet connection on the same platform it has a huge number of population that's why only 34 per cent of Indian population uses internet. (statica.com) Online teaching learning process is a laborious way to go in ordinary period which become more difficult to indulge during lockdown. Till 14th April 2020 about 5 million of mobile phones were out of network due to software and hardware problems (need reference). Not everyone has proper amenities to take online classes whether teacher or student. Teachers also need to be updated with amenities and technologies so that they also become capable of executing. ICT literacy is must for online teaching and learning, it rejuvenate process of education along with better content with efficiency of teachers as well as student in understanding process of learning through technology.

Figure 6 shows that majority (69.30%) of the students said that good quality of network was a big problem followed by lack of sufficient internet data (41.30%) to attend classes, improper devices/ equipment (37.30%) content is less understandable in online class (30%), distraction due to surrounding (24%), teachers have less knowledge about technology (23.30%) and less knowledge of students toward technology (22.70%) respectively were the challenges faced by students during online classes. Once the lockdown will be over and life will be on the struggle of being normal, the precaution and awareness will only help. Although, from time to time government is suing SOP for the general masses and institutes but a rigorous follow-up can save human being. Standard protocol cannot be applicable for every situation, so to know the student's opinion on the precautions applicable for academic institute one section was added to the tool made for information collection. The respondents mentioned that maintaining social distancing in class room (73.30%), mandatorily wearing mask (69.30%), provision of sanitizer in every classroom (64%), thermal health checking (58.70%), avoidance of all kind of cultural events (or the events which attracts more number of students) in university (58%), proper hygiene and precautions in hostels (55.30%), running mess in batches (52.70%), proper arrangement of furniture to maintain physical distancing in classrooms (50.70%), virtual meetings only (46%) and restricted use of blackboard (33.30%) were the major suggested precautions to be strictly adopted by the university.

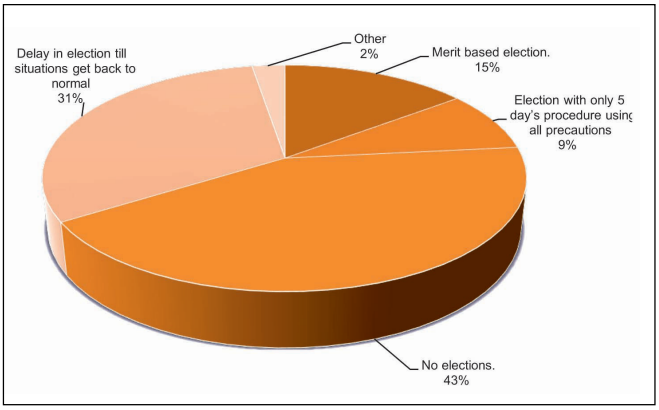

Figure 5: Procedure to be adopted for student union election

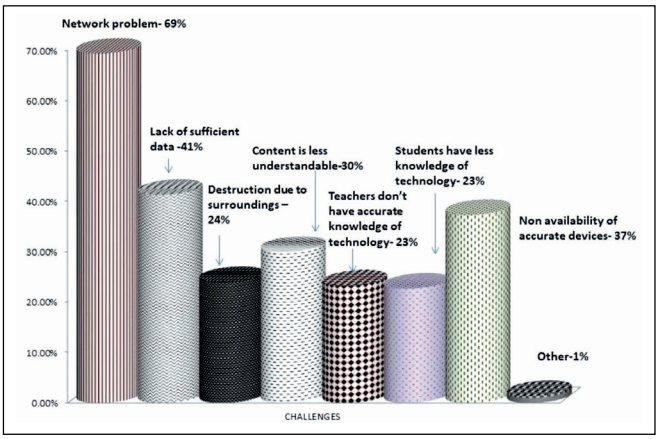

Figure 6: challenges faced by students during the process of online learning

CONCLUSION

In current time period more students are interested in online-classes and are aware with online learning and teachers are also putting efforts to facilitate learning even in summer vacations. There is a large number of students who still are not awarded and use e-library and MOOC courses there is a need for spreading awareness among student so that they can get benefit of such facilities. The common challenges like network problem, lack of sufficient data, distraction due to surrounding etc. can be taken care off. There is a need of ICT training to teachers as well as students for better and proper implementation of online learning and they should be well equipped with amenities. One should keep in mind that when study resumes there is need to follow many precautionary measures for premises and students' union elections as well.

Paper received on : June 02, 2020
Accepted on : June 08, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (16-20)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Awareness and Perception on the Issues Arising out of Undesirable Pattern of Rainfall of the Rice Farmers

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ABSTRACT

Farmers' awareness and perception on the erratic pattern of rainfall would help to develop appropriate extension educational strategies to manage these issues systematically. The study was conducted in the Madurai district of Tamil Nadu, India with local extension workers, crop scientists and 50 active rice cultivating farmers selected randomly to analyse respondents' level of awareness and perception. It was reported that high rainfall during nursery stages affects seed germination. Incidences of root rot, chaffy grains formation and soil erosion were also recorded under high rainfall conditions. Leaf mite infestation, mealy bug attack, and bacterial leaf blight disease were more intense during heavy rainfall conditions. Poor rainfall led to, deprived ground water availability, reduction in rice cropped area, intensive weed growth and non-possibility of profitable crop. Erratic rainfall affected growth duration, grain setting, yield and stages of rice crop. At the time of ripening erratic rainfall affected crop growth severely. Based on the findings of the study, a suggestive 'Climate led Transfer of Technology (ToT)' Module has been developed.

Keywords: Awareness, Climate change, Documentation, Perception, Rainfall pattern

INTRODUCTION

Throughout the world there is significant concern about the effects of climate change and its variability on agricultural production. Researchers are much concerned with the potential damages and benefits that may arise in future from climate change impacts on agriculture, since these will affect domestic and international policies, trading pattern, resource use and the average crop yield (Dinar *et al.,* 1998; Cline, 2007; Seo and Mendelsohn, 2008). Climate change will affect agriculture through effects on crops, soils, insects, weeds and diseases and livestock. Small changes in temperature and rainfall could have a significant effect on the quality of cereals, fruits, aromatic and medicinal plants and result in changes in prices and trade patterns. Pathogens and insect populations are strongly dependent upon temperature and humidity. Increases in these parameters will change their population density resulting in loss in yield. (Nguyen, 2012).

Research evidences shows that changes in temperature and rainfall in India could reduce average rice yield by 15 to 25 per cent, average wheat yield by 30 to 35 per cent (Kavikumar and Parikh, 1998) and farm net income by 8 per cent (Mendelsohn *et al*., 1994). According to Nguyen (2012), rainfall pattern is a very important limiting factor for rain-fed rice production. Higher variability in distribution and a likely decrease in precipitation will adversely impact rice production and complete crop failure is possible if severe drought takes place during the reproductive stages. Farmers' awareness and perception on the erratic pattern of rainfall would

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help to develop appropriate extension educational strategies to manage these issues systematically. Preetisharma *et al.* (2018) indicated that majority of the farmers (57.50%) had high level of awareness on the issues of heavy rainfall. The study recommends that there is a need to create awareness among farmers and extension personnel should play important role in educating the farmers about mitigation and adaptation strategies. The studies of Chunera and Amardeep (2018) shows that the major information needs of farmers to manage climatic issues were crop management strategies, drought/ flood tolerant crop varieties, climate change tolerant livestock breeds, climate-smart agriculture practices and insurances. Considering the merit of the above facts, the present study has been formulated with the specific objectives to document the issues arising out of the undesirable pattern of rainfall and to study the awareness and perception level of the rice farmers of these issues.

METHODOLOGY

Madurai district was finalized for the study being prominent rice producing districts of Tamil Nadu and rice farmers are frequently being affected by erratic rainfall. Two villages namely Mangulam and Purasupatti were selected from Madurai East block of Madurai. Twenty five farmers from each identified village were selected by simple random sampling techniques, thus the total sample size was 50 active rice cultivating farmers. 44 local extension workers and 32 rice scientists. The rainfall induced issues were documented on the following two themes viz., common agricultural issues arising out of undesirable pattern of rainfall and pests and diseases induced due to undesirable pattern of rainfall. During the documentation process sixteen common agricultural issues and four issues related to the rainfall induced pests and diseases were identified –(Table 1). On these issues farmers' level of awareness and perception were analysed. Awareness was analysed on two response categories as 'Aware' and 'Not aware' with a score of 2 and 1 respectively. Similarly, perception was assessed on two response categories as 'Agree' and 'Disagree' with a score of 2 and 1 respectively.

Percentage analysis was done to get meaningful interpretation of the results. Cumulative frequency method was used to categorize the respondents into low, medium and high in their level of awareness and perception. Data were collected using structured and standardized interview schedule.

RESULTS AND DISCUSSION

It is observed from the Table 1 that cent percentage of the respondents was aware that high rainfall during cropping causes chaffy grains and there is a reduction in the rice cropping area due to poor rainfall. An equal percentage of the respondents (96.00%) had awareness of the facts such as ground water availability is very much affected because of poor distribution of rainfall, low rainfall during rice cropping leads to intensive weed growth and there is a considerable yield loss due to erratic rainfall. An equal percentage of the respondents (78.00%) were aware that higher rainfall during nursery stage affected seed germination and non possibility of profitable crop because of failure in monsoon shower. A little less than three fourth of the respondents (74.00%) were aware that root rot incidence was a major issue during the time of high rainfall. Majority of the respondents were aware that recommended crop management practices could not be adopted because of erratic rainfall (70.00%) and crop stages affected during the time of erratic rainfall (66.00%). An equal percentage of the respondents (64.00%) were aware that crop submergence and yield loss was a common issue during the times of cyclonic adverse rainfall and erratic rainfall affected growth duration of rice crop under rainfed condition. Almost an equal percentage of the respondents were aware that high rainfall caused crop lodging problem in CO(R) 51 during harvesting stage (58.00%) and the grain setting was severely affected by adverse rainfall during that stage (56.00%). Half of the respondents (50.00%) were aware that erratic rainfall at ripening stage reduces crop growth severely. More than two fifth of the respondents (44.00%) had awareness that soil erosion was a regular issue during higher intensity rainfall.

Regarding the perception, a vast majority of the respondents (96.00%) agreed that due to poor rainfall the rice cropped area had been reduced. An equal

Table 1: Distribution of respondents according to their awareness and perception level on the issues arising out of undesirable pattern of rainfall (n=50)

Common agricultural issues	Awareness		Perception	
	N	%	N	%
Higher rainfall during nursery stage affects seed germination	39	78.00	34	68.00
Soil erosion is a regular issue whenever there is higher intensity rainfall	22	44.00	10	20.00
Crop submergence and yield loss is a common issue during the times of cyclonic adverse rainfall	32	64.00	31	62.00
High rainfall causes crop lodging problem in CO(R) 51 during harvesting stage	29	58.00	12	24.00
High rainfall during cropping causes chaffy grains	50	100.00	47	94.00
Root rot incidence is a major issue during the time of high rainfall	37	74.00	30	60.00
Ground water availability is very much affected because of poor distribution of rainfall	48	96.00	43	86.00
There is a reduction in the rice cropping area due to poor rainfall	50	100.00	48	96.00
Profitable crop is not possible because of failure in monsoon shower	39	78.00	32	64.00
Low rainfall during rice cropping leads to intensive weed growth	48	96.00	42	84.00
Erratic rainfall affects growth duration of rice crop (rainfed)	32	64.00	30	60.00
Erratic rainfall at ripening stage reduces crop growth severely	25	50.00	22	44.00
The grain setting is severely affected by adverse rainfall during that stage	28	56.00	25	50.00
Crop stages are affect during the time of erratic rainfall	33	66.00	32	64.00
Recommended crop management practices could not be adopted because of erratic rainfall	35	70.00	30	60.00
Comparing to the past, there is a considerable yield loss due to erratic rainfall now a days	48	96.00	47	94.00

Table 2: Distribution of respondents according to their awareness and perception level on pests and diseases induced by rainfall (n=50)

Agricultural issues	Awareness		Perception	
	N	%	N	%
Rice leaf mite infestation will be more during the times of heavy rainfall	37	74.00	23	46.00
Rice mite infestation will be more during the times of heavy rainfall	38	76.00	25	50.00
Rice mealy bug attack will be more during the times of heavy rainfall	47	94.00	22	44.00
Bacterial leaf blight disease will be more intense during heavy rainfall conditions	50	100.00	47	94.00

percentage of the respondents (94.00%) agreed that high rainfall during cropping caused chaffy grains and there was a considerable yield loss due to erratic rainfall now a days comparing to the past. Most of the respondents perceived that ground water availability was very much affected because of poor distribution of rainfall (86.00%) and low rainfall during rice cropping led to intensive weed growth. Majority of the respondents opined that higher rainfall during nursery stage affected seed germination (68.00%) and an equal percentage of the respondents (64.00%) felt that profitable crop was not possible because of failure in monsoon shower and crop stages were affected during the time of erratic rainfall followed by 60.00 per cent of the respondents who felt that root rot incidence was a major issue during the times of high rainfall, erratic rainfall affected growth duration of rice crop under rainfed condition and recommended crop management practices could not be adopted because of erratic rainfall. Half of the respondents (50.00%) agreed that the grain setting was severely affected by adverse rainfall during that stage. A little more than two fifth of the respondents (44.00%) agreed that erratic rainfall at ripening stage reduced crop growth severely. Almost one fourth of the respondents (24.00%) agreed that high

Table 3: Distribution of respondents based on their overall awareness level on agricultural issues arising out of undesirable pattern of rainfall (n=50)

Category	Number	Percentage
Low	10	20
Medium	19	38
High	21	42
Total	50	100

Table 4: Distribution of respondents based on their overall perception level on agricultural issues arising out of undesirable pattern of rainfall (n=50)

Category	Number	Percentage
Low	4	08
Medium	31	62
High	15	30
Total	50	100

rainfall caused crop lodging problem in CO(R) 51 during harvesting stage and one fifth of the respondents (20.00%) agreed that soil erosion was a regular issue during higher intensity rainfall.

As far as the awareness and perception of the respondents is concerned on pest and diseases arising due to rainfall (Table 2), cent percent of the respondents were aware about intense bacterial leaf blight disease during heavy rainfall conditions. A vast majority (94.00%) was aware about higher rice mealy bug attack during the times of heavy rainfall. Almost an equal percentage of the respondents were aware about more rice mite infestation (76.00%) and rice leaf mite infestation during the times of heavy rainfall (74.00%). An overwhelming majority of the respondents (94.00%) agreed that higher bacterial leaf blight disease, more rice mite infestation

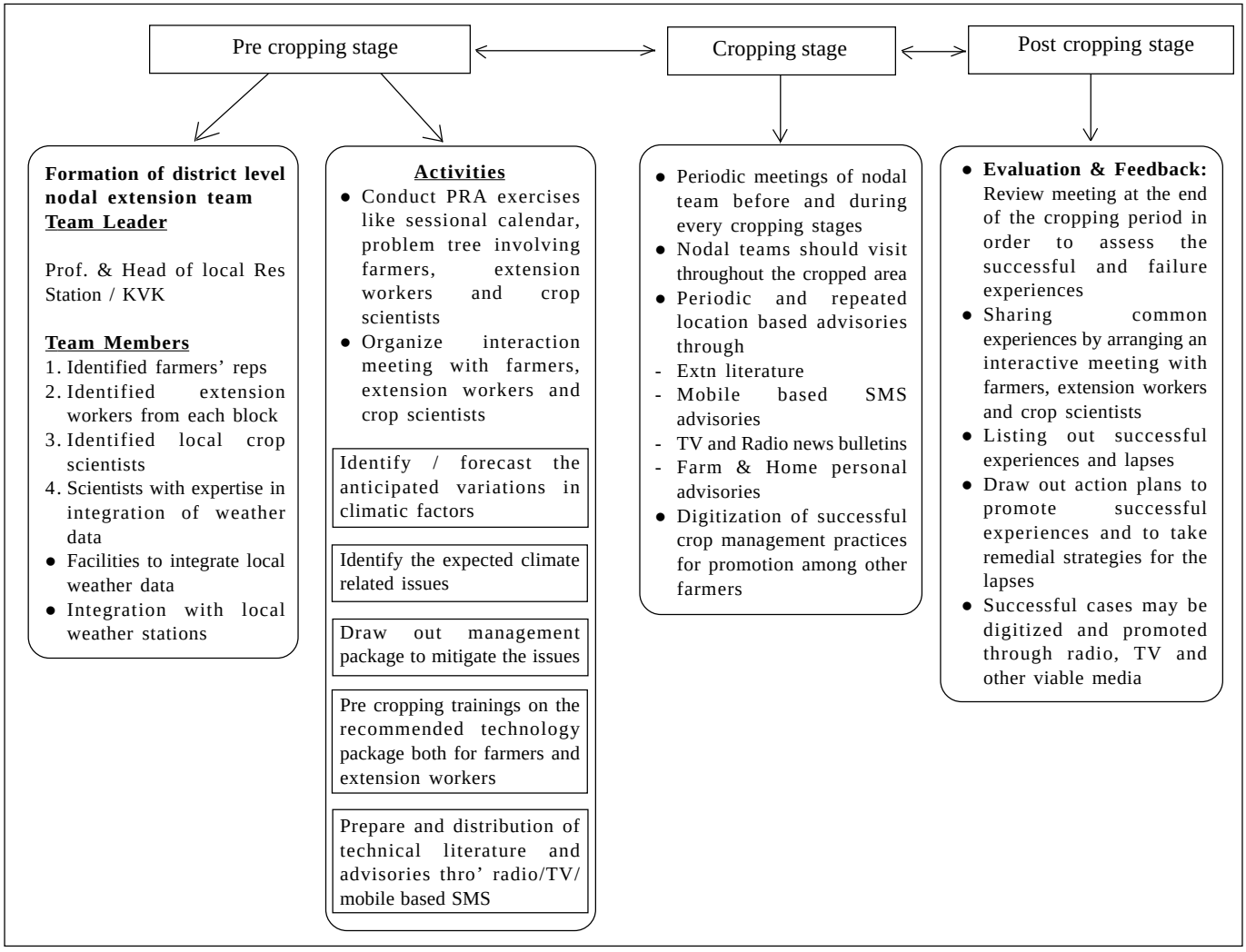

Figure 1: Suggestive transfer technology module for climate led extension activities in the rice eco system

(50.00%) during the times of heavy rainfall. Almost an equal percentage (46.00%) of the respondents perceived higher rice leaf mite infestation and rice mealy bug attack).

Overall level of awareness of the respondents on different agricultural issues, pests and diseases induced by undesirable pattern of rainfall was studied and the findings are given in the Table 3. The Table shows that slight more than two fifth of the respondents (42.00%) had high level of awareness followed by 38.00 per cent of the respondents who had medium level of awareness. Only one fifth of the respondents (20.00%) had medium level of awareness.

Overall level of perception on different agricultural issues, pests and diseases induced by undesirable pattern of rainfall was studied and from the data collected the respondents were categorised and given in the Table 4 which indicate that majority of the respondents (62.00%) had medium level of perception on issue due to undesirable pattern of rainfall. This was followed by more than one fourth of the respondents (30.00%) who had high level of perception. Only 8.00 of the respondents had low level of respondents.

CONCLUSION

High rainfall during nursery stages affects seed germination. Hence, root rot incidences, chaffy grains formation and soil erosion were also recorded under high rainfall conditions. At the time of cyclonic adverse rainfall crop submergence and yield loss is a common issue. CO(R) 51 faced lodging problem during harvesting stage as well. Rice leaf mite infestation, rice mealy bug attack, rice mite infestation and bacterial leaf blight disease were more intense during heavy rainfall conditions. The awareness and perception level of the respondents was almost medium with respect to all the listed out issues. Considering this a formal organized body is to be set up at district level to take care of these issues. This may be addressed as district level nodal extension team. Climate led Transfer of Technology Module' has been suggested on the basis of findings in Figure 1.

Paper received on : April 10, 2020
Accepted on : April 30, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (21-25)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Communication Behavior of Farmers in Chatra District of Jharkhand

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ABSTRACT

Effective communication from different source and channels are the essence of extension which provides agricultural information and knowledge to the farmers. A study was conducted on the communication behavior of farmers in Chatra district of Jharkhand in two blocks namely Prtappur and Gidhour selected randomly. Four villages selected purposively from these blocks and a total of 200 farmers were selected randomly from these 4 selected villages. Data collected through personal interview, group meeting, and structured schedule showed that among wall writing (51%) in mass communication Krishak Mitra (81%) in individual communication and Mobile message (81%) in group communication were the important sources available in a farmer's field situation. It was found that majority of the farmers used wall writing, progressive farmers, and mobile message for accessing information. It was also found that KVK scientist was the most credible source of information followed by FLDs conducted by KVK scientist.

Keywords: Communication, Credibility, Group, Individual, Mass, Source

INTRODUCTION

Several past studies have pointed out that there is a tremendous gap between knowledge generation and knowledge utilization. In Chatra district of Jharkhand about 75 per cent of the population depends on agriculture. Productivity and profitability of different crops and vegetables are very low compare to state and country-level because district farmers are still traditional concerning communication behavior. Personal localite channels are mainly used by them. Agriculture, Horticulture, ATMA, KVKs, NGOs and other government agencies using so may communication tools and channels to provide access and refine technologies which are suitable in micro-farming and socio-economic condition of Chatra district on real-time but still not reaching on a satisfactory level. It is observed that for acquiring improved agricultural technologies and their knowledge, communication behavior of individuals and their groups plays an important role in this process. Keeping this fact under consideration present study conducted to know the communication behavior of farmers concerning agriculture development.

METHODOLOGY

The study was conducted in the Chatra district of Jharkhand. Out of 12 Blocks in the district namely, Gidhour and Pratappur were selected randomly for the study. Two villages selected from each block, Gidhour and Barisakhi, Pratappur and Sidiki were chosen on the consideration that one is nearer to the headquarter while another is far away from the headquarter thus a total of four villages selected for the study. As it was planned to study communication behavior of the farmers of the vegetable farmers, only those farmers were selected who had at least one hectare of land. Such farmers were listed with the help of Block Technology Manager (BTM) and

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Assistant Technology Manager (ATM) of the four selected villages. 50 farmers selected from each village randomly from the list which was provided by BTM and ATM i.e. total of 200 farmers used as respondents of the study. Data were collected from individual farmers through a personal interview with the help of constructed interview schedules, group meeting, and non-formal discussion with the farmers in the presence of block agriculture officer, BTM, and ATM. Respondents were asked to indicate the extent of use of communication source, for quantifying data 0 for never use 1 for some time and 2 for always response was assigned. Communication behavior in terms of use of different communication sources and the credibility of different communication sources was analyzed by applying simple statistical techniques like frequency, percentage, weighted mean score, and rank order.

RESULTS AND DISCUSSION

Communication is an important factor for flow of new technology from extension scientists to formal extension officers / workers to the end-users i.e. farmers. In this process the all source divided into three categories according to number of users mass communication, individual communication, and group communication were considered. Communication variables such as availability and use of various communication channels and credibility of different communication channels were studied.

Availability of mass communication source among farmers presented in Table 1 shows that majority of farmers (51%) received message through wall writing followed by TV (45.5%) and radio (40%) respectively. Newspaper (36.0%), farm magazine (35.0%) and Kisan

Table 1: Availability of communication sources among farmers (N=200)

S.No.	Source	Frequency	Percentage	Rank
A	**Mass**			
1	Radio	80	40.0	III
2	TV	91	45.5	II
3	Wall writing	102	51.0	I
4	Farm Magazine	70	35.0	V
5	News Paper	72	36.0	IV
6	Kisan Mela	69	34.5	VI
B	**Individual**			
1	Progressive farmer	80	40.0	V
2	Farm School	41	20.5	VII
3	BTM/ATM	122	61.0	II
4	KVK Scientists	92	46.0	III
5	Block Agriculture officers	42	21.0	VI
6	Village level workers (VLW)	91	45.5	IV
7	Krishak Mitra	162	81.0	I
C	**Group**			
1	Field day organizes by KVK	80	40.0	V
2	Group meeting organized by ATMA	122	61.0	II
3	Training programme organized by KVK	91	45.5	IV
4	FLD Conducted by KVK	69	34.5	VI
5	Demonstration conducted by ATMA	64	32.0	VII
6	WhatsApp Group	110	55.0	III
7	Mobile message group	162	81.0	I

Mela (34.5%) were also available to access knowledge upto some extent. Sharma *et al*. (2012), reported that the other important sources of information and helpline telephone number was least preferred source among the farmers. However, the perceived quality and relevance of the information provided by these sources was highly variable. Availability of individual level communication source among farmers shows that out of 200 farmers 81 per cent of farmers reported that *Kisan Mitra* is available at door steps followed by BTM/ATM (61%), KVK scientist (46%), village level workers (VLW) (45.5%) respectively. Upto some extent progressive farmers (40%), block agriculture officer (21%), farm school (20.5%) was also available as a source of communication for seeking knowledge in the field situation. Further, 81 per cent farmers had mobile sets and able to access messages like a mobile message, 61 per cent were able to participate in a group meeting organized by ATMA, 55 per cent farmers had android mobile and able to received WhatsApp message whereas 40 per cent farmers were able to participate in field day organized by KVK. Only 34.5 per cent farmers were able to establish communication through field days organized by KVK on the CFLD plot followed by demonstration conducted by ATMA (32%) respectively.

Extend of use of different communication sources: The use of different types of available communication sources i.e. mass, group, and individual farmers were studied and the result is given in different heads.

Use of mass communication source: Mass communication source used by farmers given in Table 3.

Table 2: Distribution of the farmers based on the use of communication sources

S.No.	Source	Always	Sometimes	Never	Weighted mean score	Rank
A	**Mass**					
1	Radio	70	92	38	1.16	II
2	TV	64	78	58	1.03	IV
3	Wall writing	94	62	44	1.25	I
4	Farm Magazine	24	48	128	0.48	V
5	News Paper	68	72	60	1.04	VI
6	Kisan Mela	78	84	38	1.2	III
B	**Individual**					
1	Progressive farm	142	28	30	1.56	I
2	Farm School	42	60	98	0.72	V
3	BTM/ATM	109	60	31	1.39	II
4	KVK Scientist	64	102	34	1.15	IV
5	Block Agriculture officer	15	26	159	0.28	VI
6	Village level worker (VLW)	42	61	97	0.72	V
7	Krishak Mitra	79	81	40	1.19	III
C	**Group**					
1	Field day organizes by KVK	60	64	76	0.92	VII
2	Group meeting organized by ATMA	79	82	39	1.2	III
3	Trainign programme organized by KVK	68	49	83	0.92	VI
4	FLD Conducted by KVK	52	69	79	0.86	IV
5	Demonstration conducted by ATMA	48	78	74	0.87	V
6	WhatsApp	98	74	28	1.35	II
7	Mobile message	102	68	30	1.36	I

Table 2 clearly shows the extent of the use of different communication sources by the farmers. The weighted mean score of different sources shows that as a communication source wall writing was used up to the greatest extent (1.25) followed by Radio (1.16), Kisan Mela (1.2), News Paper (1.04) respectively. However, television (TV) was found to be the least useful source by the farmers (1.03) because only a few farmers had television sets in rural areas and electricity supply was also a great problem so the farmers were unable to assess information through Television in the rural area of Chatra district. Further, progressive farmers of the village was used up to a greater extent (1.56) followed by BTM/ ATM (1.39), *Krishak Mitra* (1.19), KVK scientist (1.15) Village Level workers (6.72) and Block agriculture officer (0.72) respectively. It happened due to the reason that progressive farmers always interact and participate in all scientific activities conducted by KVK or ATMA at the district level and acquire more knowledge. BTM and ATM working under the ATMA project were also available at the local level. Block agriculture office was found to be least used by farmers because they were engaged in other development activities at block level so they could not spare time for agriculture extension work. Among group sources, mobile message (1.36) was the most used source, followed by WhatsApp (1.35), group meeting organized by ATMA (1.2), field day organized by KVK (0.92), training program organized by KVK (0.92), CFLD conducted by KVK, demonstration conducted by ATMA (0.87) and (0.86) respectively. It happened because under demonstration and CFLD program only targeted farmers were acquiring knowledge through participation in every field operation during the demonstration. But through mobile and WhatsApp message communication was established among large numbers of farmers due to easy access of message without wasting money and time as now a day mobile message and WhatsApp becomes more popular source among farmers. A similar finding was also reported by Badaya *et al.* (2018) found that mobile phone-based information and communication technologies help to reduce the risks and uncertainties, emerging challenges

Table 3: Source credibility pattern operating in farmers' setting

S.No.	Source	No of responding expressed their first choice	Percentage	Rank
1	Radio	30	15.0	VX
2	TV	55	27.5	XI
3	Whatsapp message	17	8.5	XVII
4	Mobile voice call	22	11.0	XVI
5	News paper	61	30.5	IX
6	Kisan Mela	59	29.5	X
7	Progressive farm	74	37.0	V
8	Farm School	22	11.0	XVI
9	BTM/ATM	65	32.5	VIII
10	KVK Scientist	98	49.0	I
11	Block agriculture officer	26	13.0	XV
12	Villege Level Worker (VLW)	42	21.0	XII
13	Krishak Mitra	26	13.0	XV
14	Field day organized by KVK	79	39.5	III
15	Group meeting organized by ATMA	69	34.5	VI
16	Training programme organized by KVK	68	34.0	VII
17	FLD conducted by KVK	94	47.0	II
18	Demonstration conducted by ATMA	78	39.0	IV
19	Mobile message	36	18.0	XIII

in agriculture and provide instant solution, timely market information and improve livelihood and also help to overcome information asymmetry existing among the group of farmers. According to Islam and Gronlund (2011), Digital information and communication technologies (ICT) play a major role in sustainable agricultural development by bridging the gap between farmers and experts in agriculture innovation systems.

Effectiveness of communication source depends upon its credibility perceived by the end-users. Source credibility pattern of the farming community studied and presented in table-3 shows that KVK scientist as a source of communication had the highest level of credibility (49.0%) followed by FLD conducted by KVK, field days organized by KVK (39.5%), demonstration conducted by ATMA (34.0%), progressive farmers (37%), group meeting organized by ATMA (34.5%), training program organized by KVK (34%), BTM and ATM working under ATMA project (32.5%), newspaper (30.5%), *kisan mela* (29.5%), TV (27.5%), village level worker (21%), mobile message (18%) and radio (15%), respectively. However, block agriculture officer (15%), *Krishak Mitra* (15%), mobile voice call (11%), WhatsApp message (8.5%) were the least credible source of information because farmers generally believed on seeing is believing concept so that frontline demonstration conducted by KVK and demonstration conducted by ATMA were considered more credible than the formal source of information similar finding was also reported by Singh *et al.* (2001); Slathia *et al.* (2012) and Kumar *et al.* (2018).

CONCLUSION

On the basic findings, it may be concluded that wall writing, TV, radio were highly accessible by farmers as a mass communication source. Krishak Mitra, BTM/ATM and KVK scientists were available as individual sources whereas mobile message, group meeting organized by ATMA, WhatsApp group, and FLD conducted by KVK were the available important source among the farming community of Chatra district. As for as the credibility of the source is concerned KVK scientist, FLD conducted by KVK were the most creditable source among the farming community of Chatra district. Hence, it may be suggested that KVK scientists to start regular visits among farmers and conduct more CFLD and FLD on gap-filling mode. It is also advocated that extension scientist/officer need to work as a passion for the benefit of the farming community.

Paper received on : April 20, 2020
Accepted on : May 05, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (26-30)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Social Media Usage Among Agriculture Collegian in North-Eastern India

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ABSTRACT

The study attempts to understand the recent trends of social media use and the phenomenon of distractions among agriculture collegian in North-Eastern Hill states of India. A sample of 343 students drawn from 7 colleges of six North-Eastern Hill states was surveyed. The results showed rampant usage of social media among the agriculture collegians in the region. Social media like WhatsApp and Facebook were used by as many as 97 per cent and 93 per cent of the respondents respectively. Majority of the students spent significant amount of time on using social networking sites that too, regularly. Wastage of time in irrelevant activities and health related issues were perceived as major negative consequences of social media by the students. Social media exposure in higher agricultural education can play the positive role in information creation, sharing and socialization ultimately creating social wealth.

Keywords: Information sharing, Learning, Media learning, Social media

INTRODUCTION

The social media is a relatively new but fast-growing category of online and interactive gateway. These applications are usually user-generated content rather than supplier generated and thereby allowing peer-to-peer communication and user-participation (Nambisan and Nambisan, 2008; Shankar and Malthouse, 2009). It is a new form of communication and consists of a variety of communication tools such as blogs, collaborative projects, social networking sites, content communities and virtual world (Kaplan and Haenlein, 2010). These sites contribute by providing unlimited opportunities to interact, socialize and share with each other (Correa *et al.*, 2013, Ozguven and Mucan, 2013).

According to Global Digital Statistics (2014), there are 2.95 billion (41% of total population) people who are active Internet users with 2.03 billion penetrations of active social media users, whereas 1.56 billion of them access these social applications through their mobile devices (We are social, 2014). Social media applications are commonly used by millions of people across the world for different reasons on the regular basis (Al-rahmi *et al.*, 2014). This rapid growth in acceptance of social media applications in a short period of time is due to its increasingly widespread operation by students (Kirschner and Karpinski, 2010). This increase in the use of these applications is because of its convenience, flexibility and functionalities (Al-rahimi *et al*., 2013). These tools are highly beneficial for students of higher education and modernizing the process of student learning, interaction, collaboration and sharing (Chai-lee, 2013 and Al-rahmi *et al*., 2014). The social media experimentations with innovative farmers. The experimentation with innovative farmers had shown that it is not only helping in scaling the farmers' innovations but also institutional innovations at large (Nain *et al.,* 2019). However, on the other hand, these applications are also a source of distraction and

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divert students' attention from their learning (Kirschner and Karpinski, 2010; Purcell *et al.*, 2013; Junco and Cotten, 2012). Internet has rapidly entered the life of the people in the 20th century. Educational literature which is freely accessible such as dictionaries, encyclopedias, references, databases etc. play an important role in distant learning, in collaborative projects with students from other schools, universities, countries and also enables discussion of different problems with them. Internet in the sphere of education is really unique and was invented especially for education (UNESCO, 2003).

Internet turned to a symbol of change as it offered unlimited choices to access information. Internet affects education process, offering alternative and creative methods of learning, and helps to acquire desired information and has changed the concept of time and place. In every aspect of education and learning different applications of internet technology are spreading (Tutkun, 2011). Internet has changed the way people access information and wide ranges of learning resources are available on the Internet (Johnson, 2011). The present study investigates the usage pattern and associated challenges of social media among agriculture collegian in north eastern hill states of India which is landlocked and poorly connected with the outside world.

METHODOLOGY

The present study was conducted during 2016-17 in six North-Eastern Hill States. One college each from Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and two colleges from Tripura were selected for this study. Accordingly, all the 3rd year UG students and 1st year PG students (as the population has sufficient experience and exposure about ICT tools) of the constituent colleges of Central Agricultural University was purposively chosen for the study. However, based on availability and eagerness of the respondents, 343 students from 7 colleges of NEH region has taken part in the survey, which constitutes about 70 per cent of the total population under investigation. A questionnaire was designed after conducting a comprehensive review of the related literature. Frequencies, percentage, mean and standard deviation were mainly used for interpretation of data. Frequency, percentage and average were used for descriptive analysis of the data and results have been presented both tabular and pictorial format.

RESULTS AND DISCUSSION

ICTs are increasingly being used by public authorities as well as by individual for information access through smart phone, computer, laptop etc. Nowadays personalized web information is becoming a trend. The needs and competencies of students vary and ICTs facilitate one-to-one learning. The future trend of the higher education system may be a more personalized and customized way of learning leading to better performance of the students. The findings in Figure 1 shows the distribution of students according to availability of ICT resources such as mobile, tablet, PC, Laptop and Internet connectivity for agricultural education purpose. It was observed that almost all (99.42%) the students had mobile/ tablet, 88.34 per cent of the students had PC/laptop. Majority of the students (88.05%) had access to internet connectivity.

Students use social media to stay "connected" with their friends and be up-to-date with their individual interests. Even if they are not completely engaged in class, or subject areas or remain absent from the class, social media could add that familiar territory for the students to work with a tool they interact every day. The teacher also is enriched with the facility to tweet, post out topics public materials that were covered, over all supposed to be covered that day. Social media technologies offer the capability to both receive and create content with the hope that a collected intelligence emerges. Table 1 presents usage level of different social media among the selected students. Usage of social media viz., WhatsApp and Facebook was as high as 97 per cent and 93 per

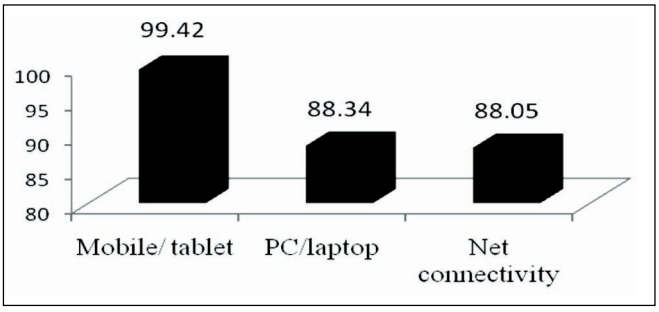

Figure 1: Availability of personal ICT resources

Table 1: Distribution of respondents according to usage and time spent on social media (n=343)

Social Media	Usage		Level of usage				
	Frequency	Percentage	Never	Occasionally	Monthly	Weekly	Daily
Facebook	318	92.71	29(8.45)	85(24.78)	8(2.33)	53(15.45)	168(48.98)
WhatsApp	333	97.08	11(3.21)	17(4.96)	2(0.58)	12(3.50)	301(87.75)
Google Groups	181	52.77	167(48.69)	64(18.66)	16(4.66)	37(10.79)	59(17.20)
Wiki	234	68.22	109(31.78)	111(32.36)	9(2.62)	56(16.33)	58(16.91)
Twitter	80	23.32	267(77.84)	53(15.45)	10(2.91)	3(0.87)	10(2.92)
Blog	42	12.24	300(87.46)	28(8.16)	4(1.67)	8(2.33)	3(0.87)
Google +	239	69.68	104(30.32)	119(34.69)	24(7.00)	40(11.66)	56(16.33)
OthersInstagram	24	7.00	-	10(2.91)	-	5(1.46)	9(2.62)
YouTube	15	4.37	-	4(1.67)	3(0.87)	3(0.87)	5(1.46)
Hike	9	2.63	-	4(1.67)	-	2(0.58)	3(0.87)
We chat	2	0.58	-	1(0.29)	-	-2	1(0.29)
LinkedIn	3	0.87	-	1(0.29)	-	(0.58)	-

Figures in parenthesis indicate percentage

cent of the students respectively. On the contrary, the usage of Twitter (23.32%) and Blog (12.24%) was low. Further, it was observed that daily use of WhatsApp and Facebook was made by 88percent and 49 per cent of the students respectively. Likewise 16.33 per cent, 7.00 per cent and 34.69 per cent of the students have indicated using wiki, Google+ on weekly, monthly and occasionally basis respectively. Only few students (2.91%, 1.67%, 1.67% 0.29% and 0.29%) reported to have used Instagram, YouTube, hike, we chat, LinkedIn, respectively in learning purposes. Manjunatha (2013) reported that 80 per cent of the students spend significant amount of time on using Social Networking Site (SNS) regularly and 20 per cent of the students do not spend any time using SNS. Reema and Gopal (2014) found that among undergraduate college students from University of Delhi who actively interacted on SNSs, usage of Facebook topped the list with 100 per cent usage, it was followed by Twitter with 43 per cent and WhatsApp with 26 per cent.

Figure 2 shows the extent to which the respondents agree with the negative impact of ICTs. Majority (68% and 66%) of the students were of the view that time wastage in irrelevant activities and health related issues were the major negative impacts of ICTs. Students, and sometimes teachers, can get hooked on the technology aspect, rather than the subject content. Facebook, Twitter, Youtube, Instagram and other social media networking sites can be a potential distraction to living and learning in the real world. Security and privacy social problems and lack of innovation and creativity were indicated as negative impact by 63, 49 and 44 per cent of the respondents respectively. Social media applications are highly utilized by students for a lot of non-educational purposes; these applications may badly affect students' academic life and learning experiences (Kuppuswamy and Narayan, 2010). These new technologies are revolutionary but some of its applications are highly insecure (Trusov *et al.,* 2009). The use of social media applications such as social networking among students

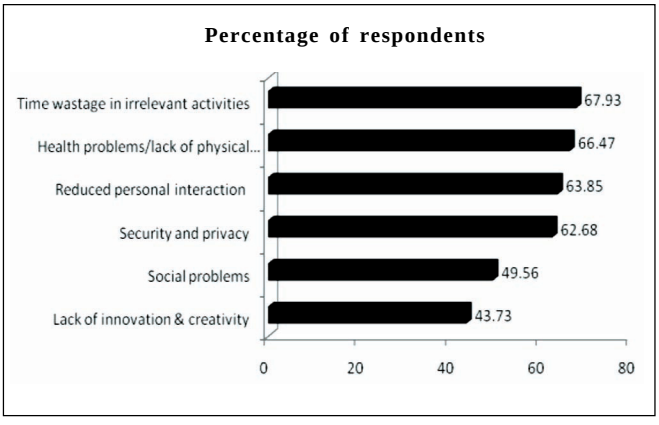

Figure 2: Perceived negative impact of ICT

are mostly for entertainment (Khan, 2012), other applications such as Facebook is significantly negative associated with GPA and learning performance (Junco *et al*., 2011; Junco, 2012b; Junco and Cotten, 2012) and especially among fresh students (Junco, 2015). Social media includes a wide variety of technologies and provides benefits to any group looking to market itself, including universities. Social media platforms provide ways for higher education institutions to market their services as well as to highlight student connections that can break barriers and encourage communication.

CONCLUSION

The study investigated the access to and usage of ICT and more specifically engagement on social media of the students of higher agricultural education in north east India. Penetration of smart phones and computers among the students is near complete barring a few isolated issues with regard to electricity supply and internet services. WhatsApp, Facebook and other applications are being used by almost all and usage of other tools is on the increase. The exposure is expected to enhance learning outcomes and develop professional network for mutual gain. However, one has to guard against the ill effects of social media that leads to distraction, wastage of time and poor health.

Paper received on : April 12, 2020
Accepted on : April 24, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (31-34)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Constraints Faced by Potato Farmers in District Kannauj (U.P.)

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ABSTRACT

Potato has been considered to be one of the unavoidable necessities of life and it is demanded by the people belonging to all the classes of the society. The consumption of the potato has been rising at faster rate. Uttar Pradesh is the leading potato growing state in the country with a production of 9.93 million tonnes and Kannauj district leads in production but in respect of average production has 8th place in Uttar Pradesh, therefore, to know the constraints for lagging behind of the productivity of potato, present study was conducted in Jalalabad block and from Talgram block on 240 potato growers. Statements related to different constraints were framed and responses were recorded on three point Likert's scale; Always, Sometimes and Never. Iimportant constraints always faced by maximum responded in cultivation was "lack of availability of sufficient good quality high yielding seed', while in post harvest handling 'lack of processing unit' was maximum faced constraint, and in marketing 'fluctuations of prices' was major of constraints faced by farmers. The suggestions to overcome the problem of production were; reduced cost of fertilizer, supply of good quality of seed by government agencies at their door step and training regarding scientific potato production technology, post-harvest handling and processing.

Keywords: Constraints, Potato, Suggestions

INTRODUCTION

Potato is most widely grown vegetable crop in the country with 25.70 per cent share. The area under potato cultivation is 1.28 million hectare with total protection 22.49 million tonnes. UP produced 15.5-16 million tonnes of potato in 2019-20 and is the largest producer in the country. Kannauj district is the highest in area but in respect of average production has 8th place in Uttar Pradesh. Total area covered for potato is 36,000 hectare with a productivity of 250 quintals/ hectare. The present rate of agricultural production could be substantially increased if the available technology is brought to bear with the production processes and programmes, focusing more and more on transferring new technologies away from the confines of laboratories and researchers. Fortunately, India has favourable aground climatic conditions for potato cultivation but may not fulfil the need of people, when our farmer are not trained with skilful utilisation of technology. The farmers face a number of problems in production, marketing and storage of potato like inadequate supply of inputs, unawareness about the improved technology of potato production, high transportation cost, use of home produced seed, lack of availability of sufficient good quality seed well in time, irrigation problem, non-availability of sufficient finance non- remunerative market price for the produce, lack of sufficient storage space and malpractices exercised by traders (Arneja *et at.*, 2009; Lal *et al.*, 2011 and Katayani *et al.*, 2017). Therefore, it is necessary to know the

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constraints faced by farmers so the study Constraints faced by farmers in cultivation, post harvest handling and marketing of potatoes was planned with specific objective to identify the issues and challenges faced by farmers in potato production and marketing.

METHODOLOGY

Descriptive research design with multistage purposive random sampling technique was adopted to carry out the study. District Kannuaj was purposively selected for being major potato growing area of the state. Two blocks of district Kannuaj namely Jalalabad and Talgram were selected and two villages form each selected block were randomly selected. 60 farmers from village Moosar and Tilpai village of Jalalabad block and Katkaiya and Tighara from Talgram block were selected randomly and thus making 240. Pre coded interview schedule was used as a tool for data collection. Statements related to different constraints faced by the respondents related to cultivation, post harvest handling and marketing were framed and responses were recorded on three point Likert type statements as always (3) sometimes (2) and never (1). Mean score was processed for each and every statement and accordingly ranked to know the maximum and minimum faced constraints r to show what was the biggest challenge to be addressed first for enhancing productivity.

RESULTS AND DISCUSSION

Analysis of Table 1 reveals that in potato cultivation 73.33 per cent farmers always face constraints related to lack of availability of sufficient good quality seed followed by 66.66 per cent who always faced lack of awareness of insecticides and pesticide constraint. Sixty five percent farmers were found unaware about seed treatment and 61.66 per cent always underwent with poor electric facilities constraint. But in contrast 55.00 per cent farmers sometimes felt shortage of fertilizers on time. Poor and uneven germination was least experienced followed by over dosage of fertilizer, lack of improper soil moisture level, poor fertility of land respectively. Further 'poor electricity facilities' and high cost of input for potato cultivation was also a major problem faced by farmers with Mean Score 2.65 and 2.61, respectively. Further, the table reveals that 69.16 per cent respondents always faced constraints 'lack of producer processes link' followed by 66.66 per cent who always perceived lack of processing unit. A little less than sixty percent farmer faced lack of quick efficient and low cost transport system while more than 56 per cent faced storage loss due to delay process of storing and marketing constraints. High charges of cold storage were also one of major constraints which farmers undergo. Lack of cold storage facilities in nearby areas was the minimum faced constraints with Mean Score 1.60 whereas, lack of quick efficient and low cost transport system' was always faced by 58.33 per cent farmers while about more than thirty percent faced this 'sometimes'. On the other hand about fifty six percent farmers complaint about distance of cold storage from field and market as a big constraint in post harvest handling of potato.

It is clear that 'fluctuation of price' was the biggest constraint in marketing of potato with Mean Score 2.66, followed by 'low price due to quality deteriorated during storage (Mean Score 2.62, rank II). The 3rd important constraint reported in marketing of potato was 'lack of marketing information' (2.60), whereas, 'lack of investment in transportation' and no minimum support prices were least mentioned constraints in marketing of potato with Mean Score 2.4 and 2.33, respectively. Maximum (66.66%) farmers always faced problem of 'fluctuations in prices' followed by 62.50 per cent who always underwent with low price due to quality deteriorated in storage. Sixty per cent farmers reported that they always felt problem of lack of marketing information while 58.33 per cent always faced lack of linkage between producer and market as a constraint. Only 13.33 per cent respondents never reported problem of lack of marketing facilities through cooperative societies, followed by 12.50 per cent who opined that high investment on transportation from field to market and no fixation of support prices problems were faced by them.

CONCLUSION

The global area under potato during 1998 was about 18 million ha with a total production of about 295 million tonnes. U.P. is the major potato growing state in India. Potato is the main source of important nutrient but the

Table 1: Various constraints faced by potato growers (N = 240)

S. No.	Statement	Always	Some-times	Never	Mean score	Rank
A.	**Related to Cultivation**					
1.	Lack of availability of sufficient good quality seed	73.33	26.66	_	2.73	I
2.	Poor/ uneven germination in the field	34.16	53.33	30	2.15	XII
3.	Poor electric facilities	60.00	40.00	-	2.65	II
4.	Attack of pest and disease	58.33	41.66	_	2.58	V
5.	Lack of personal irrigation facility	55.83	29.16	36	2.40	VIII
6.	Unawareness about seed treatment	65.00	31.66	8	2.60	IV
7.	Lack of awareness of insecticides and pesticides	66.66	23.33	24	2.56	VI
8.	Lack of improper soil moisture level	52.50	33.33	34	2.29	X
9.	Poor fertility of land	45.88	37.50	40	2.29	X
10.	High cost of input for potato cultivation	60.00	33.33	16	2.61	III
11.	Shortage of fertiliser and time being demand	37.50	55.00	9	2.37	IX
12.	Over dosage of fertiliser	45.00	38.33	40	2.28	XI
13.	Problem due to weed	56.66	31.66	28	2.45	VII
B.	**Related to Post Harvest Handling**					
1.	Improper handling of products	50.00	37.50	12.50	2.37	VIII
2.	Lack of quick efficient and low cost transport system	58.33	33.33	8.30	2.50	IV
3.	High charges of cold storage	54.16	45.83	-	2.54	III
4.	Lack of cold storage	18.33	31.66	50.00	1.60	IX
5.	Lack of producer processes link	69.16	25.00	12.50	2.63	II
6.	Distance of cold storage from field to market	55.83	34.16	10.00	2.45	V
7.	Lack of processing unit	66.66	33.33	-	2.66	I
8.	Improper shorting of damaged and infected tubers	50.00	43.33	6.66	2.43	VI
9.	Storages loss due to storing and marketing	56.66	29.16	14.16	2.42	VII
C.	**Related to marketing**					
1.	Lack of linkage between producer and marketing	58.33	35.00	6.66	2.51	IV
2.	Fluctuation of price	66.66	33.33	-	2.66	I
3.	Lack of investment in transportation	54.16	33.33	12.50	2.41	IX
4.	Lack of marketing information facilities through cooperative societies	46.66	40.00	13.33	2.33	VII
5.	Transportation losses	48.33	45.00	6.66	2.41	IV
6.	Poor management of local mandies	50.00	40.00	10.00	2.40	VI
7 .	No fixation of minimum support prices	45.83	41.66	12.50	2.33	VIII
8.	Low price due to quality deteriorated during storage	62.50	37.50	-	2.62	II
9.	Lack of marketing information	60.00	40.00	-	2.60	III

productivity and processing has not been able to keep pace with the current trends. The potato growers should not only produce potatoes in bulk but also compete in quality, grading and varieties of potato grown. The yield per hectare is also very low as compared to that of the developed countries because potato growers are facing constraints. Important constraints responsible for varying magnitude in cultivation was lack of availability of sufficient good quality seed followed by high cost of input and devices and poor fertility of land. During post harvest handling 'lack of processing unit', 'lack of producer processer's link' and 'high charges of cold storage' were the challenges potato growers underwent with. Major constraints faced in marketing were 'fluctuations of prices', 'low price due to inferior quality in storage' and lack of information regarding marketing platform. The suggestions that to overcome the problem of production are; cost of fertilizer should be reduced, the good quality of seed should be supplied by government agencies at their door step and training should be provided to potato growers regarding scientific potato production technology and post harvest handling and processing. FPOs can also be formed for marketing and processing. To overcome the constrains of marketing the price of potato should be ensured, more number of cold storage should be established and proper marketing facilities should be provided by government. Many steps are being taking by KVKs but still there is gap hence more such efforts are needed.

Paper received on : April 24, 2020
Accepted on : May 04, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (35-38)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Adoption Level of Soil and Water Conservation Technology under NICRA in Chatra District in Jharkhand

D. Oraon[1]*, Anjani Kumar[2], R.K. Singh[3], U.K. Singh[4] and Zunaid Alam[5]

ABSTRACT

Many states in India are affected by land and water degradation. Successive technologies have promoted to prevent soil and water conservation adopted on a large scale. This paper deals adoption level of soil and water conservation technologies in purposively selected NICRA village of Chatra district in Jharkhand India. A total of 105 farm families were selected purposively for study. Data collected through personal interview, group meeting, and structural schedule from selected respondents. It was found that under crop production (SWC) Soil and water conservation technology, intercropping (88.57%), whereas under mechanical SWC technologies land leveling (97.14%) was adopted by farmers. Most of the respondents come under a medium level of adopter categories related to soil and water conservation technologies.

Keywords: Adoption, Adoption level, Conservation, Soil and water

INTRODUCTION

There has been a significant rise in the frequency of extreme weather events in recent years affecting farm-level productivity and impacting staple food availability at the national level. Within a season, severe droughts and floods are being experienced in the same region posing serious problems to the farmers, agricultural scientists, and extension staff. Fall in yield leads to shortage of food grains, price rise, and inflation affecting the poor the most. Therefore, it is important to enhance the resilience of Indian agriculture to climate change considering the facts. Indian Council of Agricultural Research (ICAR) has initiated a network project on National Innovation on Climate Resilient Agriculture (NICRA) to enhance the resilience of Indian agriculture through strategic research on adoption and mitigation (Covering crops, livestock, fisheries, and natural resource). Natural resource management in this project refer to the management of natural resources such as land, water soil with particular focus on how management affects the quality of life for both present and future generation. KVK, Chatra has also been selected by ICAR as a lead centre to implement the project in farmers' field situations in 2011. In this regard, KVK Chatra selected tribal-dominated village Mardanpur of Chatra block which has 105 farm families and demonstrated more than 25 land, soil, and water conservation and management technologies among farmers to adopt and disseminate among farmers of nearby villages to mitigate climate effect on productivity and profitability of the crops and livestock components. The study was taken to assess the adoption behavior of the farmers towards vegetative and mechanical soil and water conservation technologies

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METHODOLOGY

The study was conducted in Mardanpur village of Chatra block in Chatra district of Jharkhand, where the NICRA project under operation from 2011 to till date. The village was selected purposively because of so many mechanical and crop production soil and water conservation technologies stand demonstrated in the farmer's field. An exploratory reach design was followed and a total of 105 farmer respondents were selected.

An adoption scale was developed to measure the extent of adoption of intervened technologies by the respondents. A list of intervened soil and water conservation technologies was prepared. Respondents were asked to indicate the intervened technologies adopted by them with their extent, for quantifying data each practice was given score O for not aware 1 for aware but not adopting, 2 for adopting responses. Thus total score secured by an individual was the obtained adoption score. The adoption quotient was worked out for each respondent by the following quotient and it was taken as the adoption score for individual respondents.

$$\text{Adoption Quotient} = \frac{\text{Adoption score obtained by respondents}}{\text{Maximum possible adoption score}} \times 100$$

Overall adoption level was worked out by calculating the arithmetic mean of the adoption quotients of all the respondents as given below:

$$\text{Over all adoption level} = \frac{\Sigma_{I=1}^{N} = AQ}{N}$$

Where, AQ = Adoption quotient for i^{th} respondents

N = Total number of respondents

RESULTS AND DISCUSSION

Frequency distribution of different soil and water conservation (SWC) practices adopted by farmers in NICRA village presented in Table 1.

Table 1 shows that the majority of farmers (88.57%) adopted intercropping practices as crop production soil and water conservation technologies followed by contour farming (76.19%), summer plowing (73.0%), mulching (65.71%) and multiple cropping (66.95%) respectively. The least adopted crop production soil and water conservation technologies were cover cropping and green manuring respectively. It may be due to more water and time required for decomposition of Sesbania (Dhaicha) crop which was used as green manuring crops in the field. It is revealed from the table that most of the farmers adopting intercropping and contour farming because KVK introduces so may remunerative intercropping practices i.e. maize + ladies finger or maize + red gram etc. which gave midterm income to the farmers during the lean period i.e. July and August month and also check soil and water erosion in undulating land. Counter farming is also feasible and sustainable practices in this situation because this practices held tilling on sloped land along lines of consistent elevation to conserve rainwater and reduce soil losses from surface erosion. The objectives are achieved using furrows, crop rows, and wheel tracks acres slopes, all of which act as reservoirs to catch and retain rainwater, thus permitting increased infiltration and more uniform distribution of the water.

Table 1: Frequency distribution of crop production (SWC) technologies adopted by farmers (N=105)

Technology	Number of farmers adopted the technologies	
	Number of respondent	Percentage
Contour farming	80	76.19
Inter cropping	93	88.57
Cover cropping	42	40.0
Green manuring	38	36.19
Mulching	69	65.71
Summer ploughing	73	69.52
Multiple cropping	64	60.95

Frequency distribution of mechanical soil and water conservation technologies (SWC) presented in Table 2 which shows that the majority of the farmers (97.14%) adopted land leveling as a mechanical soil and water conservation technologies followed by Bora bandi (77.14%) Marginal bunding (74.28%) Terracing (65.71%) and contour bunding and construction of new ponds (64.76%) respectively. Whereas the other mechanical

Table 2: Frequency distribution of mechanical, Soil and water conservation (SWC) technologies adopted by farmers (N=105)

Technology	Number of farmers adopted technologies	Percentage
Marginal bunding	78	74.28
Contour bunding	68	64.76
Terracing	69	65.71
Land leveling	102	97.14
Check dam	74	70.47
Gully Plough	46	43.80
Bora Bandi	81	77.14
Renovation of old pond	74	70.47
Construction of new pond (5% module)	-	-

soil and water conservation technologies such as Gully plow were adopted only (43.80%) farmers. It is also observed from Table 2 that the other important technologies such as the construction of the new pond (5% model) were not adopted by farmers due to higher cost. Only project fund constructed pond used by the farmers. It was observed that due to undulating land situation water staging in the field is a great problem so that land leveling technologies become so popular among the farmers and about 100% of farmers adopted these technologies.

Table 3 shows that 51 per cent farmers were under medium level categories of adoption of the technologies, 28 per cent respondents were having high level of adoption towards vegetative soil and water conservation technologies followed by 21 per cent respondents having low level of adoption. 53 pert cent fell under the medium level adoption categories concerning mechanical soil and water conservation technologies. followed by 25 per cent of respondents were having a low level of adoption towards mechanical soil and water conservation technologies (SWC) only 22 per cent of farmers having a high level of adoption towards mechanical soil and water conservation technologies. It was observed from table that most of the respondents come under a medium level of adoption categories. Because construction and maintains of soil and water conservation technologies required money every year except few practices, So the majority of the farmers are unable to invest and adopt technologies on a large scale.

The overall extent of the adoption of both the vegetative and mechanical soil and water conservation technologies was calculated with the help of developing adoption quotient. It was found that the overall adoption level of vegetative soil and water conservation technologies (SWC) was 33.16 per cent whereas the overall adoption of mechanical soil and water conservation technologies was 28.62 per cent. It explained that in general, the extent of the adoption of vegetative soil and water conservation technologies was higher than the mechanical soil and water conservation technologies. It may be due to the higher cost incurred in the adoption of mechanical soil and water conservation technologies. Mechanical Soil and water conservation technologies (SWC) were adopted on a community basis, which requires a participatory approach among beneficiaries

Table 3: Adoption level of vegetative and mechanical soil and water conservation (SWC) technologies by NICRA village farmers (N=105)

Adoption level	No. of respondents	Percentage	Mean	S.D.
Vegetative				
Low level below (4-3 scores)	22	21		
Medium level between 4.3 to 7.94 scores	54	51	5.89	1.74
High level above (7.94 scores)	29	28		
Mechanical				
Low level below 3.57 score	26	25		
Medium level between (3.57 to 7.31) scores	56	53	6.08	1.79
High level (above 7.31 scores)	23	22		

CONCLUSION

It may be concluded that the low cost or no cost vegetative and mechanical soil and water conservation technologies suitable to small farm holding should be developed for their easy adoption in the farmer's field situation. The technologies should be developed considering the bio-physical and socio-economic conditions of the area. Which become sustainable, reliable, profitable, among the farming communities. Regular awareness and capacity building program organized by extension agency for creating awareness and interest among farmers related to soil and water conservation technologies. It is also advanced training required to extension officers and extension workers related to soil and water conservation technologies.

Paper received on : April 02, 2020
Accepted on : April 18, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (39-44)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Constraints in Adoption of Groundnut Cultivation Technology by the Farmers of Odisha

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ABSTRACT

Groundnut is one of the important oilseeds and it contributes substantially to Indian economy. Its importance is notable in terms of nutrition as well as revenue generation. The present study was carried out in Dhenkanal and Angul districts of Odisha involving 220 respondents chosen through multistage simple random sampling procedure. Data were collected through pre-tested interview schedule. The constraints were measured at 3-point continuum *i.e.* not serious, serious and most serious with scores 1, 2 and 3 respectively. Institutional constraint was identified as the most serious among all the major dimensions of constraints. Inadequate knowledge on recommended practices of the production technology, paucity of credit facility, fluctuating market price, lack of awareness about new technology were the other constraints in decreasing order of seriousness. A well-orchestrated institutional mechanism need to be thought of for support and incentives to the farmers.

Keywords: Adoption, Constraints, Groundnut, Production technology

INTRODUCTION

India is the largest producer of oilseeds in the world and this sector occupies an important position in the agricultural economy of the country. Oilseeds are among the major crops that are grown in the country apart from cereals. In terms of acreage, production and economic value, these crops are second only to food grains (Jha *et al.,* 2012). Groundnut (*Arachis hypogaea* L.) is one of the most demanding oil crops to have effect on Indian economy. It is grown on a large scale in almost all the tropical and sub-tropical countries of the world. During 1950-51 groundnut area, production and yield in India were 4.49 M ha, 3.48 MMT and 775 kg/ha respectively, which has increased to 4.91 M ha, 9.18 MMT and 1893 kg/ha respectively during 2017-18. Though groundnut production has almost doubled from 3.48 MMT in 1950-51 to 6.69 MMT in 2018-19 but it has decreased from the previous year *i.e.* against 9.18 MT (GOI, 2019).

Odisha state contributes more than 2/3rd oilseed production towards the total oilseed production of the country. Groundnut production continues to dominate the oilseed production in the state (Samal *et al.,* 2017). The state of Odisha is sixth in India in terms of groundnut production. (358.03 MMT in 2017-18). The districts Dhenkanal and Angul occupy 5th and 6th position in groundnut production in Odisha with 21.8 MMT and 20.72 MMT production respectively. They combined contribute 11.9 per cent of the total groundnut production of Odisha (GoO, 2019). However, availability of quality seeds is a major problem for the smallholder farmers, forcing them to save their own seeds year after year or to get it from other farmers (ICRISAT, 2016). Emphasis should be given on the unexplored resources of groundnut production in the state. Shiferaw *et al.* (2013) mentioned that availability and adoption constraints must be analysed and addressed in order to achieve the potential impact of new technology

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in agriculture. Even after the availability of improved groundnut varieties, yields are still low compared to their potential. Hence it is time to identify the hindrances in the adoption of groundnut cultivation technology and to suggest measures to overcome these constraints as much as possible so as to increase groundnut production. The present investigation is an attempt to identify the constraints perceived by the farmers in adoption of recommended groundnut cultivation technology

METHODOLOGY

Angul and Dhenkanal districts were selected purposively from Odisha as both the districts share a significant contribution towards the groundnut production of the state. From each district three blocks were selected purposively on the basis of large area under groundnut cultivation. From each block two villages were selected randomly making 12 villages. From each village 18-20 groundnut farmers were selected randomly making a total sample size of 220 for primary data collection. Both primary and secondary data were collected for the study. A pre tested (on 20 farmers in each selected district) structured interview schedule was developed for collection of primary data. Secondary data were collected through reviewing various literatures and from District Agriculture Office, Dhenkanal; Angul. A list of 37 constraints was prepared in consultation with experts and various past studies. The constraints were grouped under six major dimensions of constraints *viz.,* production constraints, economic constraints, ecological constraints, post-harvest and marketing constraints, social constraints and institutional constraints having 8, 8, 4,7, 5 and 5 statements respectively. The responses from the farmers were collected on a three-point continuum *viz.,* most serious, serious and not serious with score of 3, 2 and 1 respectively. The tabulated data were analysed using frequency, percentage, mean score and rank order. The total score was obtained by summing up individual score for the constraint. Based on total score the mean average score for each constraint was calculated to ascertain seriousness of each constraint and finally the constraints were given rank order as per perceived seriousness. It is one of the approaches to scaling responses in survey research (Kumar *et al.,* 2017).

RESULTS AND DISCUSSION

All the constraints under six major dimensions were studied, the frequency and percentage for each constraint were computed. Thus, the constraints were presented in the following table with their respective mean scores and rank order.

A. Production Constraints

It is evident from Table 1 that 'improper plant protection measures' was the most serious constraint perceived by the farmers among production constraints with a mean score of 2.64 followed by 'unavailability of seed timely' (2.63). The farmers were not having expertise in using the proper plant protection chemicals, applicable for the particular diseases during different stages of crop growth. The farmers should be trained on plant protection measures to protect the crop from the common diseases like tikka disease and groundnut rust and pests like white grub and termite attack. The farmers also perceived 'application of improper dose of fertilizers and micronutrient' as the third most serious constraint having a mean score 2.16. Even if the farmers were well known to the fertilizers and micronutrients to be applied, somewhere they failed to apply with recommended doses. The other production constraints perceived by the groundnut growers were 'unavailability of location specific high yielding varieties', 'weed infestation', 'poor yield due to aflatoxin in groundnut', 'incompetency in seed treatment' and lack of irrigation facilities with a mean score of 2.02, 1.63, 1.52, 1.39 and 1.27, respectively. To make the field manually weed free in regular interval is time consuming and requires more labourers. Irrigation was not major problem for them because most of the farmers were cultivating the crop on the riverbank. Non-availability of inputs in time and at reasonable prices, lack of knowledge about various cultivation practices, inadequate improved implements and inadequate labourers were reported as barriers to adoption of recommended groundnut cultivation technology by Umesh (1991); Shinde *et al.* (2003); Kasana and Kumar (2013); Sharma *et al.* (2013) and Banla *et al.* (2018).

B. Economic Constraints

Among economic constraints 'unavailability of credit facility' was the most prioritised constraint by the farmers

Table 1: Constraints encountered by respondents

S.No.	Constraints	Not Serious (%)	Serious (%)	Most Serious (%)	Mean Score	Rank order
A	**Production Constraints**					
1.	Unavailability of location specific high yielding varieties	11.82	74.09	14.09	2.02	IV
2.	Unavailability of quality seed timely	10.00	16.36	73.64	2.63	II
3.	Incompetency seed treatment	72.27	16.36	11.36	1.39	VII
4.	Lack of irrigation facilities	80.00	12.73	7.27	1.27	VIII
5.	Application of improper dose of fertilizers and micronutrient	6.82	69.55	23.64	2.16	III
6.	Improper plant protection measures	3.64	28.64	67.73	2.64	I
7.	Weed infestation during crop growth	51.82	33.18	15.00	1.63	V
8.	Poor yield due to aflatoxin in groundnut	62.27	23.18	14.55	1.52	VI
B	**Economic Constraints**					
1.	High cost of HYV/quality seeds	7.27	80.91	11.82	2.04	VI
2.	High cost of fertilizers	5.45	80.45	14.09	2.08	IV
3.	High cost of insecticide, pesticide, weedicide	9.09	75.00	15.91	2.06	V
4.	High cost of agricultural equipment	2.27	81.36	16.36	2.14	II
5.	High wages of labour at harvesting	25.00	71.82	3.18	1.78	VIII
6.	Unavailability of credit facility to farmers	4.55	75.91	19.55	2.15	I
7.	Vulnerable price of the produce	6.36	74.55	19.09	2.12	III
8.	Premium amount of crop insurance is high	21.82	75.00	3.18	1.81	VII
C	**Ecological Constraints**					
1.	Moisture scarce soil	72.73	11.82	15.45	1.42	III
2.	Erratic rainfall	12.27	23.18	64.55	2.52	II
3.	Delay in monsoon	73.64	14.09	12.27	1.38	IV
4.	Foggy weather	6.82	25.91	67.27	2.60	I
D	**Post-harvest and Marketing Constraints**					
1.	Lack of storage facility after harvesting	75.45	8.64	15.91	1.40	III
2.	Improper grading and drying	88.18	11.36	0.45	1.12	V
3.	Transportation problem	86.82	13.18	0	1.13	IV
4.	More Involvement of middlemen	91.82	7.73	0.45	1.08	VI
5.	No marketing facilities in remote area	4.55	84.09	11.36	2.06	II
6.	Uncertain market price after harvesting	5.00	72.73	22.27	2.17	I
E	**Social Constraints**					
1.	Lack of awareness about new technology	9.09	62.73	28.18	2.19	I
2.	Lack of family support in adopting technology	92.73	7.27	0	1.07	V
3.	Less contact with extension personnel	8.64	64.09	27.27	2.18	II
4.	Less exposure towards social media	5.00	74.55	20.45	2.15	III
5.	Poor farmer co-operative structure	76.36	18.18	5.45	1.29	IV
F	**Institutional Constraints**					
1.	Inefficient extension activities	28.64	65.45	5.91	1.77	V
2.	Lack of knowledge on recommended practices	9.55	51.36	39.09	2.29	I
3.	Inadequate follow up after conductance of training and demonstration	10.00	61.82	28.18	2.18	II
4.	Inadequate training programme on improved crop technology	7.73	69.55	22.73	2.15	III
5.	No facility for minikit trial	21.36	71.82	6.82	1.85	IV

with the highest mean score of 2.15. They are expecting some kind of credit support from the government system especially for groundnut crop. There are several institutional sources that extend credit facility to the farmers to improve the production. The farmers should avail it easily from their nearest branch. Use of groundnut harvester to harvest the crop can minimize their physical labour and can also save time. However, high cost of agricultural equipments and their rental is an impediment. Other economic constraints perceived by them in decreasing order of severity were 'vulnerable price of the produce', 'high cost of fertilizers', 'high cost of insecticide, pesticide, weedicide', 'high cost of HYV/ quality seeds', 'premium amount of crop insurance is high' and 'high wages of labour at harvesting' with mean scores 2.12, 2.08, 2.06, 2.04, 1.81 and 1.78 respectively. High cost of chemicals and fertilizers, high wages of labour, high cost of seed were the major constraints identified by Angadi (2010); Sharma *et al.* (2013); Kumar *et al.* (2018); Patel *et al.* (2018) and Rohilla *et al*. (2018).

C. Ecological Constraints

Ecological constraints also play a significant role in groundnut cultivation. 'foggy weather' was referred as the most serious constraint by the groundnut growers with the highest mean score of 2.60 followed by 'erratic rainfall', 'moisture scarce soil' and 'delay in monsoon' with mean scores 2.52, 1.42 and 1.38 respectively. According to them foggy weather adversely affected the groundnut pod development resulting in a lower yield. Untimely heavy rain is also harmful for the crop growth. As groundnut grows below the soil, moisture availability to the soil is the important aspect for the pod growth. Sufficient moisture unavailability, fertility of soil and dependency on monsoon and erratic rainfall were among the ecological constraints reported by Mishra (1998); Virmani and Shurapli (1999) and Sharma *et al.* (2013).

D. Post-harvest and Marketing Constraints

From the above table it is revealed that 'uncertain market price after harvesting' was identified as the most serious constraint and ranked as I. The second most constraint for the farmers was 'no marketing facilities in remote areas' with mean score 2.06. Other constraints perceived by farmers were 'lack of storage facility after harvesting', 'transportation problem', 'improper grading and drying' and 'more Involvement of middlemen' with mean scores 2.06, 1.40, 1.13, 1.12 and 1.08 respectively. Post-harvest constraints *viz.*, inadequate knowledge about storage pest control measures, market price fluctuation, lack of knowledge about quality range and fumigation were also mentioned by Chavda (2007) and Sharma *et al.* (2013).

E. Social Constraints

The table indicates that 'lack of awareness about the new technology' was perceived as the most serious by the respondents with rank I, followed by irregular contact with extension personnel. 'less exposure towards social media', 'poor farmer co-operative structure' and 'lack of family support in adopting technology' were the other social constraints perceived by the farmers with mean scores of 2.15, 1.29 and 1.07 respectively.

F. Institutional Constraints

It is evident from the result that 'lack of knowledge on recommended practices' was the most serious constraint perceived by the farmers hence it has got the highest mean score of 2.29. The farmers need to be made aware about latest production practices of groundnut farming. The constraint 'inadequate follow up after conductance of training and demonstration' has got the mean score of 2.18. They perceived 'inadequate training programme on improved crop technology', 'no facility for minikit trial' and 'inefficient extension activities' as other constraints with mean scores of 2.15, 1.85, 1.77 respectively. Sharma *et al*. (2013) in their study mentioned that lack of technical know-how, lack of visit of extension personnel and lack of farmers training were among the constraints in groundnut cultivation.

Figure 1 reveals that institutional constraint is the top most constraint perceived by the groundnut growers. Economic constraint is another major problem perceived by them with the second highest mean score of 2.02. Ecological constraints, production constraints and social constraint were followed with mean scores 1.98, 1.91 and 1.78 respectively. Post harvesting and marketing constraint was perceived the least serious with the mean score of 1.49.

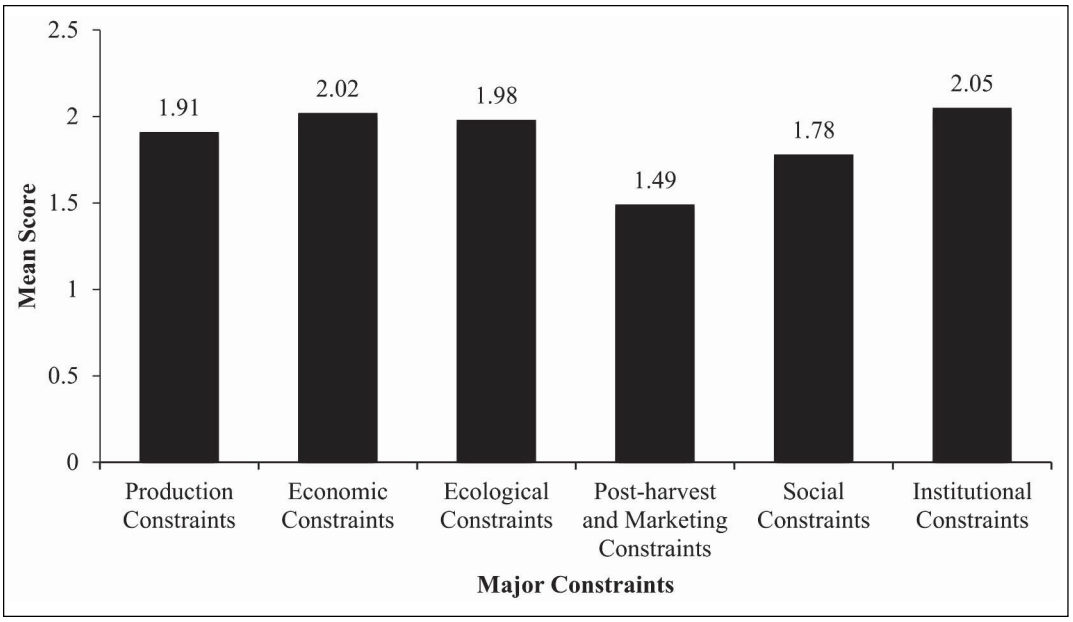

Figure 1: Comparative analysis of the major constraints

CONCLUSION

The study identified three major issues that hinder groundnut farming in Angul and Dhenkanal districts of Odisha. These are extension and advisory services, credit support and quality inputs in the form of disease-free seed, agro-chemicals and equipments. Revamped extension services, farm loans on easy terms and a network of farm service centres dealing with seed, fertilizer, chemicals and equipments would help bringing desirable changes in groundnut scenario in Odisha. A well-orchestrated institutional mechanism had to be thought of for providing required support and incentives to the farmers. These efforts coupled with extensive training of farmers on important aspects of groundnut production *viz.*, plant protection measures, seed treatment and other important aspects of the production technology need to be organised on continuous basis.

Paper received on : April 15, 2020
Accepted on : May 05, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (45-50)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Determinants of Marketed Surplus of Milk: A Micro Level Study in Khasi Hills Region of Meghalaya

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ABSTRACT

Dairy sector has been playing a pivotal role in India's socio-economic development by providing employment and income generating opportunities in the rural areas. At the micro level, it provides livelihood to millions of households. Animal husbandry has multi-dimensional role in improving socio-economic condition of agrarian community. In North eastern states the development of livestock sector is very slow which reflects the less production and consumption of milk. The study investigates the production, consumption, disposal and factors determining marketed surplus of milk in the state of Meghalaya. There lie opportunities for value addition and formation of dairy cooperative or farmer's producer organization (FPO) for development of dairy sector in the state of Meghalaya.

Keywords: Correlation, Dairy, Determinant, Marketed, Surplus

INTRODUCTION

Emerging economies of the world including India are coping with the issues relating to poverty, hunger, malnutrition, farmers suicide and community welfare *etc.* (Uchoi and Singh, 2020). Animal husbandry has been a vital and integral agricultural component in India since ages due to its numerous contributions to the rural areas as food products, draught power, clothing, income and employment (Saxena *et al.*, 2017). Out of all the livestock enterprises, dairy plays a pivotal role in our national economy. It occupies an important place in the development of the country's economy via employment generation for thousands of rural households families (Gupta and Sharma, 2010; Lalrinsangpuii *et al.*, 2016). India is bestowed with a bovine population of 192.49 million cattle, 109.85 million buffalo and 148.88 million goats (Livestock census, 2019). At the micro level, it provides livelihood to millions of village households, thus ensuring continuous supply of quality milk and its products to urban as well as rural areas (LMIS, 2015).

The state of Meghalaya being agrarian, economy also depends on animal husbandry (Singh *et al.*, 2020). Meghalaya's cattle population has been 903.57 thousand (Livestock Census, 2019). During the inter census period of 2007-2012, the livestock population has increased from 1.82 million to 1.96 million (Livestock Census, 2012). The gross milk production in Meghalaya is about 85 thousand tonnes and per capita availability is about 83 g per day which is much lower as compared to country's average of 375 g/day (GoI, 2017). The average yield was 8.951 kg per day per cow for CB cows while it was 0.774 kg per day per cow for local cows during 2017-18 (GoM, 2019). The returns from livestock sector especially from dairy and mixed farming in small and medium holdings is

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larger and highly sustainable (Singh *et al.*, 2016) in the state of Meghalaya. Most of the livestock readers are below the poverty line; consequently huge gap exists in the production and consumption of milk in the region (Beauty *et al.*, 2013). The consumption is highly correlated with production and at the same time it is highly interlinked with marketed surplus of milk of the household. Therefore, the analysis of factors associated with marketed surplus of the households in the state of Meghalaya has become the immense for further certain interventions for enhancement of marketable surplus at micro level. Hence, keeping in view the above facts, the present research paper is an attempt to work out the determinants of marketed surplus of local cattle in the state.

METHODOLOGY

The study was conducted in West Khasi Hills (WKH) and South West Khasi Hills (SWKH) districts of the state of Meghalaya. Khasi Hills Region comprises of four districts namely; East Khasi Hills, Ri-Bhoi, West Khasi Hills and South West Khasi district of Meghalaya. The WKH and SWKH were selected on the basis of low milk production of 4.62 thousand MT and 1.91 thousand MT, respectively, in the region (GoM, 2019). One block from each of selected district was selected in consultation with the officers in the Department of Animal Husbandry and Veterinary of the state. Further, two villages from each of selected block were selected. A list of farmers who were rearing livestock for milk purpose was prepared for each selected village. A sample of 73 respondents through random proportionate sampling was drawn. Primary data were collected on herd strength including breed details, human labour allocated to dairy, milk production, producer's surplus of milk, consumption, losses and disposal pattern and agencies involved in disposal of milk from producers to consumers.

The primary micro level data were analyzed by applying the different statistical tools like Marketed surplus of milk and Correlation analysis of factors of marketed surplus (Pearson's coefficient of correlation).

RESULTS AND DISCUSSION

All the sampled households (100%) possessed 'in milk and not pregnant' cattle in the entire study area. It was observed that 94.60 per cent and 77.80 per cent household maintained in-milk and pregnant cattle in WKH and SWKH, respectively. In case of dry and pregnant cattle, 49.30 per cent sampled households (56.80% in WKH and 41.70% in SWKH) had the possession (Table 2). Hence, all the sampled households were having in-milk cattle in the study area of both the districts.

Table 1: Households reporting ownership of cattle (%)

Category of animal		WKH	SWKH	Overall
In milk and not pregnant		100.0	100.0	100.0
In milk and pregnant	94.6	77.8	86.3	
Dry and pregnant		56.8	41.7	49.3
Dry and not pregnant		37.8	38.9	38.4
Pregnant heifer		8.1	-	4.1
Calves <1 year	Male	97.3	88.9	93.2
	Female	91.9	97.2	94.5
Calves >1 year	Male	62.2	19.4	41.1
	Female	51.4	22.2	37.0
Adult male		64.9	80.6	72.6

Source: Field Survey

The average (mean) cattle 'in-milk' and not pregnant' was 3.03 standard Animal Unit (SAU), 3.38 SAU in WKH and 2.67 SAU in SWKH whereas; for 'in-milk and pregnant' cattle, it was 1.08 SAU in the combined study area, WKH having 1.32 SAU and SWKH having 0.83 SAU. In the category of 'dry and pregnant' cattle, the average SAU was reported to be 0.81 SAU overall, with WKH having 0.84 SAU and SWKH having 0.78 SAU, whereas, in case of' dry and not pregnant' cattle, the average SAU was 0.82 SAU (0.62 SAU in WKH and 1.03 SAU in SWKH). In case of 'pregnant heifer', low average SAU (0.04 SAU) was observed, with WKH having 0.08 SAU and no reported SAU (0.00) from SWKH (Table 3). Hence, analysis of SAU showed the healthy size of herd in both the districts under study.

It was observed that the mean milk yield was 3.68 l/ day per household in the state, while it was 3.83 l/ day per household and 3.52 l/ day per household in WKH and SWKH, respectively. Low milk production per household may be due to lack of sufficient resources and knowledge among the farmers to maintain dairy cattle. The mean production of milk per milch animal in the state

Table 2: Milk production and marketed surplus

Particulars	Unit	WKH	SWKH	Overall
Milk production	L/day			
Average/household		3.83	3.52	3.68
Maximum/household		8.40	7.70	8.40
Minimum/household		1.50	0.90	0.90
Average/milch cow		0.82	1.01	0.89
Maximum/milch cow		1.10	1.60	1.60
Minimum/milch cow		0.50	0.45	0.45
Milk retained	L/day/household	1.42	1.20	1.31
Marketed surplus	L/day/household	2.41(63.03)	2.32(65.98)	2.37(64.42)

*Figures in parentheses are percentages of total milk production; Source: Field survey

of Meghalaya was recorded 0.89 l/ day, whereas, in WKH and SWKH district it was recorded of 0.82 l/ day and 1.01 l/ day, respectively. The overall maximum milk production of the state was recorded of 1.60 l/ day per milch animal in the state, whereas it was 1.10 l/ day per milch animal and 1.60 l/ day per milch animal recorded WKH and SWKH district, respectively as an upper limit (maximum) of mill yield. The minimum production of milk per milch per cattle was recorded to be of 0.45 l/ day at state as a whole out of which 0.50 l/ day and 0.45 l/ day in WKH and SWKH district, respectively (Table 2). Similar study by Vedamurthy (2004) also reported that the milk yield was low of local cows of Karnataka in compare to cross bred and buffalo.

The overall average amount of milk retained per household for home consumption in the entire study area was estimated 1.31 l/ day while it was 1.42 l/ day and 1.20 l/ day in WKH and SWKH district, respectively (Table 2). Marketed surplus (MS) accounted for 64.42 per cent (2.37 L/day/household) of total production in the state. The total Marketed surplus in the district of SWKH was estimated to be of 65.98 per cent (2.32 L/ day/household) of the total production which was higher than the total Marketed surplus in WKH which was observed to be of 63.03 per cent (2.41 L/day/household).

Milk requires quick disposal as it is a highly perishable commodity. Overall, the middlemen or vendors were preferred for disposal of milk through which 76.71 per cent of households disposed milk (Figure 2). Similarly, 64.87 per cent and 88.89 per cent of respondents of WKH and SWKH district, respectively disposed milk through vendors only. Around 2.73 per cent of sampled households

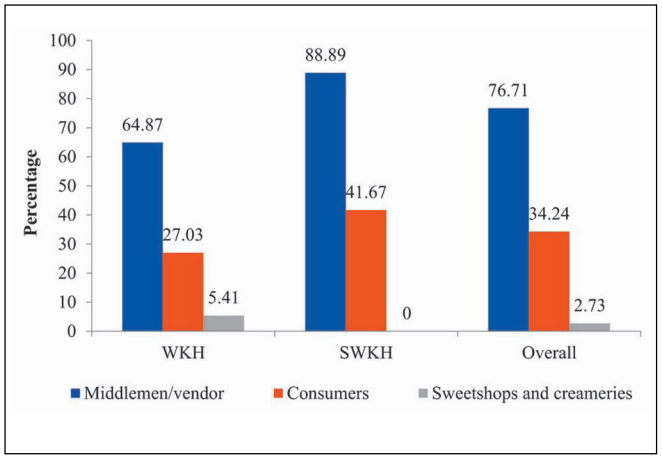

Figure 1: Share of households for milk disposal

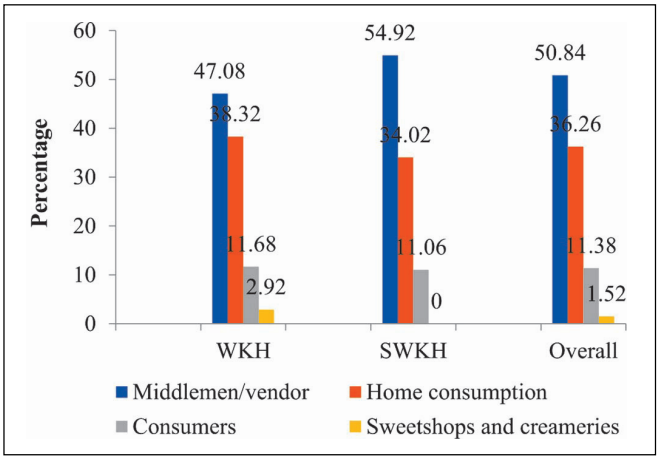

Figure 2: Agency wise share of milk disposal

Table 3: Estimated correlation coefficient (r) between marketed surplus and its factors

Particulars	Independent variable	r	p-value
WKH (n_1=37)	Total Household milk production	0.940***	0.000
	Household size	-0.470***	0.005
	Average milk price	0.686***	0.000
	Market access	-0.151	0.392
SWKH (n_2=36)	Total Household milk production	0.927***	0.000
	Household size	-0.040	0.824
	Average milk price	0.613***	0.000
	Market access	0.003	0.988
Overall (n=73)	Total Household milk production	0.931***	0.000
	Household size	-0.241**	0.049
	Average milk price	0.112	0.369
	Market access	-0.085	0.495

Note: ***, **and * indicates p<0.01, p<0.05 and p<0.10, respectively; Source: Field survey

disposed their milk to sweetshops or creameries and tea shops. The remaining households disposed milk to the consumers of the same village in locality. It was observed that the overall 50.84 per cent of milk has been disposed through middlemen/vendors, followed by consumers (11.38%) and sweetshops/creameries (1.52%). The remaining 36.26 per cent of milk consumed at home only. The milk disposal in West Khasi Hills district has been recorded and disposed through middlemen/vendors (47.08%), consumers (11.68%), sweetshops/creameries (2.92%) and remaining milk consumed (38.32%) at home. Similar trend was observed in South West Khasi Hills district whereas, through middlemen/vendors (54.92%), consumers (11.06%) has been disposed and rest consumed (38.32%) at home (Figure 1). It was observed that there was hardly practice of converting milk into various milk based by-products in the study area. Hence, ample scope was there for the interventions of value addition in milk.

As expected, out of the 4 predictor variables selected *viz.*, total household milk production (p<0.01) was positively correlated and household size (p<0.05) was negatively correlated with marketed surplus, whereas; average milk price and market access were insignificantly connected with marketed surplus over the entire study region. It refers that total household milk production level and household size executes a significant role in influencing the volume of milk marketed surplus. Total household milk production (r = 0.931, p<0.01) was positively linked with marketed surplus over the combined study area. Similar result in district wise analysis revealed that total milk production had positive correlation in WKH (r = 0.940, p<0.01) and SWKH (r = 0.927, p<0.01). It confirms that there exists a linear relationship between total household milk production level and MS; as more the volume of milk produced at household level, higher will be the marketed surplus. Similar observations were reported by Bhawar *et al.* (2019) who stated that there exist positive correlation between total household milk production and milk marketed surplus in North Karnataka. The household size (r = -0.241, p<0.05) had negative association with marketed surplus at overall level. It confirms the fact that as family size goes on increasing; marketed surplus of milk goes on decreasing. In WKH, it had a negative correlation (r = -0.470, p<0.01), while in SWKH, no significant correlation with marketed surplus had been noticed. The average milk price (r = 0.112) has shown positive but insignificant correlation with milk marketed surplus over the entire study area. But district wise correlation result shows that WKH (r = 0.686, p<0.01) and SWKH (r = 0.613, p<0.01) exhibited significant positive correlation between marketed surplus and average milk price. As farmers tend to get higher milk price, they tends to dispose more portion of their production. Similarly, market access (r = -0.085) had

Table 4: Average number of cattle (SAU) owned by the selected households

Category of animal	WKH			SWKH			Overall		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
In milk and not pregnant	3.38	7.00	1.00	2.67	7.00	1.00	3.03	7.00	1.00
In milk and pregnant	1.32	3.00	0.00	0.83	3.00	0.00	1.08	3.00	0.00
Dry and pregnant	0.84	3.00	0.00	0.78	5.00	0.00	0.81	5.00	0.00
Dry and not pregnant	0.62	4.00	0.00	1.03	10.00	0.00	0.82	10.00	0.00
Dry and unfit for breeding	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Not calved even once	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pregnant heifer	0.08	0.98	0.00	0.00	0.00	0.00	0.04	0.98	0.00
Calves <1 year (male)	1.78	4.26	0.00	1.03	2.84	0.00	1.41	4.26	0.00
Calves <1 year (female)	1.77	4.10	0.00	1.78	4.92	0.00	1.77	4.92	0.00
Calves >1 year (male)	0.52	1.42	0.00	0.22	1.42	0.00	0.37	1.42	0.00
Calves >1 year (female)	0.60	1.64	0.00	0.30	2.46	0.00	0.45	2.46	0.00
Adult male	1.05	3.33	0.00	1.91	4.44	0.00	1.47	4.44	0.00
Total number of animals	11.97	28.67	3.42	10.53	27.63	1.71	11.26	28.67	1.71

Note: Max= Maximum, Min= Minimum, SAU= Standard Animal Unit;

Source: Field Survey*

***Standard Animal Unit (SAU):** 1 SAU equals to 1 mature cow of 450 kg weight (1000 pounds); assumed to intake about 12 kg (26 pounds) of forage dry matter per day.

negative insignificant linkage with marketed surplus of milk over the whole study area (Table 3).

CONCLUSION

The dairy sector in the state of Meghalaya is taking shape however; the pace of development is slow. The sector is attracting entrepreneurship especially among youths in post harvest management of milk. The study area has ample scope of value addition through establishing Farmers Producers Organizations (FPOs) and dairy cooperatives especially in remotely located villages of the state. The factors *e.g.* milk production at micro level, size of household, price of milk *etc.* exert significant influence on marketed surplus and need to be factored in while developing strategy for dairy development in the state.

Paper received on : April 16, 2020
Accepted on : April 26, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (51-54)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Correlates of Adoption of Improved Apiculture Practices in Arunachal Pradesh

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ABSTRACT

The increasing population of India is raising alarm to search means for sufficient food for all and the employment for the young generation. The apiary or beekeeping has the potential to become the alternative of those people who needs the employment. The study was conducted in four blocks and four villages of West Siang district of Arunachal Pradesh state are selected to identify the socio-economic and personal factors affecting adoption of improved apiculture practices. The data collected from 120 respondents selected randomly revealed that the personal variable namely age, education, social participation, utilization of sources of information, mass media exposure, annual income, family type, land used, land holding and knowledge level and socio economic status correlated significantly with adoption of improved apiary practices. While correlated the age with the extent of adoption, it was negative but significant and the size of land holding was found to be negative and non-significant. The statistical tests using multiple regression analysis revealed that among the variable studied, education, family type, social participation, mass media exposure, extension contact and the knowledge level were found to exhibit positively significant contribution towards adoption enhancement of apiculture practices.

Keywords: Adoption, Apiculture, Correlation, Independent, Variable

INTRODUCTION

The increasing population of India has posed two formidable challenges before the planners; employment generation for about 35 crore people of the age group between 20 to 40 years, and provision of sufficient and nutritious food to all. Agriculture is the biggest private enterprise in our country. As 60 per cent of the population live in rural area and depend on agriculture, this sector alone can address this uphill task. Beekeeping industry, in its own humble way can contribute to this endeavour by providing part-time employment to about a million people, producing valuable food like honey worth crores of rupees and the most important, increasing the crops yields substantially through bee-pollination of various agricultural and horticultural crops that are dependent on insects for pollination. Apiary, a rural cottage industry is highly suitable for India considering its gigantic agricultural pedestal and its role in providing rural employment particularly to small and marginal farmers. Although it is labour intensive, but it will gives high return too. It can also employ whole family including women. It can also be the solution to reduce the migration of rural people towards the urban area through income generation by this practice (Phadke, 2008). India needs minimum 70 lakh bee colonies to pollinate 12 major crops which are

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dependent on insects like honeybees for pollination. As against this bare need we have just 15 lakh bee colonies. India produce about70,000 tonnes of honey every year of which 25-27,000 tonnes is being exported to more than 42 countries India has potential to produce 15 million colonies and we do not have even half a million. It is estimated that 70 to 80 per cent of the total honey production of India comes from wild honeybees. Thus about 100 million kg. of honey worth about Rs. 200 crores is annually collected from wild honeybee colonies. All this honey is mostly collected by tribal. Thus from socio-economic considerations this is a very important industry. Products of honey bees are used in cosmetic, life sustaining drug, wax and even manure.

Since arable land remain limited but population is increasing in the hilly state of Arunachal Pradesh, also Food comes from other states of India and is cheaper than the cost of production in Arunachal Pradesh. Therefore, we cannot compete with them commercially in food grain production and need to opt for some other option productive for hilly condition. In this direction, joint efforts of the state organization, AAU, Jorhat and ICAR RC for NEH Region AP Centre, Basar for the promotion of apiary in Arunachal Pradesh are being done to train and motivate the farmers to adopt as enterprise. Kashikar (2000) reported that there was positive relation between the socio economic characteristics of the farmers and extent of adoption of modern apiculture technologies. Socio-economic characteristics of growers directly influence the extent of adoption production and productivity in honey production. In the present study, efforts has been made to identify the extent of adoption of modern apiary practices among the honey producers and investigate the socio-economic and personnel characteristics of apiary unit holders with improvised honey production technologies.

METHODOLOGY

The study was carried out in Arunachal Pradesh state. The West Siang district of Arunachal Pradesh was selected purposively for study on the basis of maximum farmers have been doing this practices at their own level. The farmers were selected from the four blocks i.e. Basar, Likablai, Tribin and Aalo of Basar and Aalo divisions engaged in the apiary considering the availability of good facility and infrastructure of honey production, nearness from the district headquarter, extensive support service provided by the ICAR and line department and the market availability for sale out their produce. From these four blocks, 4 villages were chosen randomly one village from each block. From each selected villages 30 practicing farmers were selected by random sampling technique. Thus the total numbers of 120 practicing farmers were selected. The research design adopted was exploratory. The data was collected with the help of the direct observation; meetings, discussion and structured interview schedule. The data was subjected to statistical analysis such as frequencies, percentage, regression, multiple regression and association with dependent and independent variables respectively. Regression was calculated and measured where an estimate of knowledge was made by appropriate values of selected variables from $x_{1,}$ x_2, x_3…….x_n in the general formula,

$$Y = a + b_1x_1 ++ b_2x_2 + b_3x_3……..b_nx_n$$

The extent of adoption of improved apiculture practices of honey producers was studied with reference of to 10 recommended improved farm practices about honey and their by-products on the basis of review of literature and discussion with the expert, like lack of motivation among the farmers, about marketing support, mass media exposure and information access etc. Further, provisions were made for the farmers to indicate the problem.

RESULTS AND DISCUSSION

It was observed that the majority (68%) of the respondents were in the age group of 35-55 years, educated upto secondary level (30.8%) and 25 per cent of respondents were illiterate. majority (76.6%) of respondents were from the joint type of family and being as tribal community people having high level (55.00) of social participation. Further, 49.1 per cent of area used under the apiary farming under the West Siang district, 55.8 per cent of the respondents were having the medium size of land holdings but more than 20 percent of respondents were also having the big size land holding under the study area. More than half of the respondent

(52.5%) were living under below poverty line with the income of less than Rs. 12,000 per annum and had low level of knowledge about the scientific rearing of the honeybees and their products. Television was often used by 52.5 per cent, farmers meetings were often used by 50.8 per cent and newspaper was never used due to less circulation in the far flung villages. The most often used extension contact was Agriculture Assistant (64.5%), Agriculture Officers from line department (52.5%) whereas, 16.6 per cent never contacted to Agriculture Scientists.

It is evident from Table 1 that the highest mean adoption was obtained by extraction, processing and storage of honey (89.7%) followed by the beehives products (78.6%), bee rearing management (71.6%),biology of honeybees (67.3%), artificial queen rearing techniques are also important (66.6%), and the behaviour of honeybees (61.7%). The composite adoption was 61.56 per cent and the composite mean adoption gap was 38.4%. The reasons for non-adoption of apiary farming as reported were labour intensive, high rainfall prone area, lack of knowledge about the rearing, equipment and their use and lack of knowledge of bee toxicity, where farmers still require the complete knowledge.

It is observed for Table 2 that the correlation coefficient of 9 variables out of 10 variables namely Age, family type, education, area under beekeeping, land holding, source of information, extension contact, annual income, social participation and the knowledge level of the respondent about the practices was significant at 0.01 level of probability with adoption of improved apiary practices. Among this age was found negatively correlated. Further, correlation coefficient of land holding with extent of adoption was negative and non significant. It is clear from the findings that there were significant correlations between majority of characteristics of respondents and extent of adoption of improved honeybee practices. The identical findings were reported by Kashev and Hossain (1992). The variables showing positive and significant relationship need greater attention on the part of extension agency to enhance adoption of apiary rearing practices in the area.

Table 1: Adoption with respect to selected management practices

Category	Adoption among respondent (%)
Bee Behaviour	61.7
Biology of honeybees	67.3
Beekeeping equipment and their use	57.8
Bee rearing management	71.6
Seasonal management (Summer and Winter)	44.3
Bee disease, pest and enemies management	59.2
Honeybees and crop production	53.4
Artificial queen rearing technique	66.6
Bee toxicity	27.0
Extraction, processing and storage of honey	89.7
Beehives products	78.6

Table 2: Correlation between independent variables and the adoption

Correlates	Coefficient of correlation (r)
Age	-0.447**
Education	0.732**
Family type	0.639**
Land holding	-0.113
Social participation	0.920**
Annual Income	0.352**
Knowledge level	0.822**
Mass media exposure	0.939**
Extension contact	0.917**

**Significant at 0.01 level of probability

The regression analysis was performed to find out the effect and extent of influence of each variable towards the level of adoption of improved apiary practices. Out of nine variables six variables, viz., family type, social participation, mass media exposure, extension contact and education of the respondent played vital role to increase the understanding and the knowledge level and ultimately the adoption percentage among the respondent (Table 3). The findings are in conformity with Ramdasi (1998) and Anchule (2000).

The coefficient of determination value R^2 was 0.794 which shows that independent variables explained to the

Table 3: Correlation coefficient

Correlates	Coefficient of correlation (r)	Regression coefficient (Bi)	't' value
Age	-0.447**	-0.001	-0.074
Education	0.732**	-3.28	6.28**
Family type	0.639**	0.217	1.62**
Land holding	-0.113	-0.030	0.864
Social participation	0.920**	0.217	1.88**
Annual Income	0.352**	-0.009	0.053
Knowledge level	0.822**	-821	4.92**
Mass media exposure	0.939**	0.181	3.873**
Extension contact	0.917**	0.132**	2.985**

R^2 value = 0.794; F' value = 68.32; **significant at 1% level

extent of 79.40 percent in the composite adoption gain on apiary practices in the selected area.

CONCLUSION

The study has revealed that eight out of nine variables were significantly correlated with adoption of improved honeybee practices. Six variables were found to contribute towards the beekeepers' adoption of improved apiculture practices namely education, social participation, mass media exposure, family type, extension contact and knowledge level. The farmers of this region consider apiculture a profitable enterprise. Since they have showed a tendency for social participation, they need to be organized into small cooperatives societies for promoting apiculture practices and they have good knowledge regarding the apiary so training on scientific and technical knowhow and handholding for quality and quantity of honey and its' marketing to the other neighboring states can go a long way. Extension strategies should ensure adequate training in participatory methods, communication skills, method demonstrations and advisory services to deal effectively with small and marginal farmers for promotion and adoption of improved apiculture practices. There is greater role for extension to provide technical assistance, appropriate technologies, inputs and to follow systematic approach for encouraging apiary farmers.

Paper received on : April 22, 2020
Accepted on : May 08, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (55-60)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Satisfaction Level of Farmers Regarding e-Choupal Services

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ABSTRACTS

e-Choupal tackles the challenges posed by Indian Agriculture, characterized by fragmented farms, weak infrastructure and the involvement of intermediaries. The programme installs computers with Internet access in rural areas of India to offer farmers up-to-date marketing and agricultural information. ITC Limited kiosk with Internet access is run by a sanchalak- a trained farmer. Being one among the numerous private ICT initiatives need to be studied in detail owing to its success and to know about satisfaction level of users for various services provided by e-choupal. Multistage Purposive random sampling technique was adopted to carry out the research. Two villages out of two selected block were randomly selected, and from each selected village 30 e-Choupal users selected randomly for data collection. Results revealed that more than seventy five percent respondents 'Strongly agree' over the bench mark price set by ITC for crops procurement is comparatively higher than any other agencies while, more than 65% respondents were highly satisfied with marketing of crops. Majority were medium level satisfied with supply of proper inputs by e- choupal.

Keywords: e chaupal, Services, Marketing, ITC

INTRODUCTION

e-Choupal is an India-based business initiative by ITC Limited that provides Internet access to rural farmers, a conglomerate in India, to link directly with rural farmers via the Internet for procurement of agricultural and aquaculture products. The purpose is to inform and empower them and, as a result, to improve the quality of agricultural goods and the quality of life for farmers. e-Choupal tackles the challenges posed by Indian agriculture, characterized by fragmented farms, weak infrastructure and the involvement of intermediaries. The programme installs computers with Internet access in rural areas of India to offer farmers up-to-date marketing and agricultural information. ITC Limited kiosk with Internet access run by a sanchalak- a trained farmer. The computer is housed in the sanchalak's house and is linked to the Internet via phone lines or by a VSAT connection. Each installation serves an average of 600 farmers in the surrounding ten villages within about a 5 km radius. The sanchalak bears some operating cost but in return earns a service fee for the e-transactions done through his e-Choupal. The warehouse hub is managed by the same traditional middle-men, now called samyojaks, but with no exploitative power due to the reorganization. These middlemen make up for the lack of infrastructure and fulfill critical jobs like cash disbursement, quantity aggregation and transportation. There are number of ICT initiatives in India by the Government, CO-operative agencies, Non-governmental Organizations and private players. Most of them are location specific or crop specific, isolated and are confined to a small area. e-choupal, one among the numerous private ICT initiatives need to be studied in detail owing to its success hence, present study has been planned to know about satisfaction level of users for various services provided by e-choupal.

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METHODOLOGY

Multistage Purposive random sampling technique was adopted to carry out the research. District Allahabad (now Prayagraj) was purposively selected as e-Choupal is running successfully. District was divided into seven blocks and two blocks namely Karchana and Meja were purposively selected as e-Choupal is very well functional in these two blocks. Two villages out of each selected block were randomly selected, and from each selected village 30 e-Choupal users were selected randomly for final data collection making a total of 120. Data were gathered through personal contact by a pre-coded interview Schedule. For the socio-economic status of Users Trivedi and Pareek (1964) scale was used to categorize as per the score they got.

The farmer's satisfaction towards services of e-Choupal was measured using the modified scale developed by Arun Kumar (2005). The scale followed the ranking procedure of 0,1,2,3 and 4 for strongly disagree, disagree, undecided, agree and strongly agree respectively. An index was developed from the five-point continuum scale. The index consists of twenty-eight statements upon which the responses were sought from the users of e-Choupal. The satisfaction index of an individual was calculated as below:

$$\text{Satisfaction Index} = \frac{\text{Score obtained by the individual}}{\text{Maximum score (112)}} \text{ X } 100$$

RESULTS AND DISCUSSION

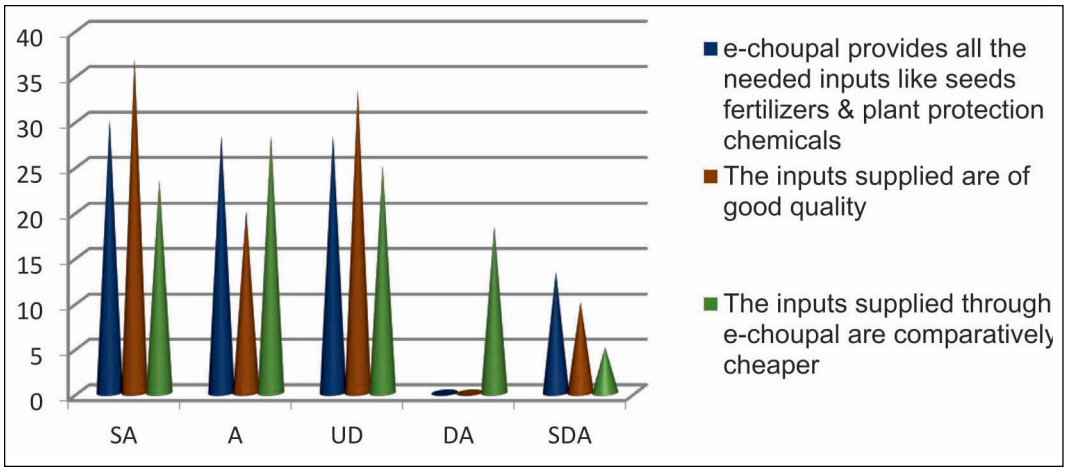
Data pertinent to socio-economic reveal that majority of respondents under study were from middle age group i.e. 31-50 years, general category, marginal farmers, literate (can read and write only), and belonged to nuclear family, small farmers (having 1-2 ha land), doing agriculture only. Annual Income of maximum respondents were Rs. 50000-75000, fell in medium category. As per the score obtained majority of the respondent were of medium socio-economic status followed by 31.67 per cent who belonged to low-socio economic status group.

Data in Table 1 reveals that about sixty three percent responsible were found 'Agree' about 'The technological information provided by e-choupal are highly relevant to farming system' followed by 60.00 percent who 'agree' upon 'The technological information provided by e-choupal are suited for both big and small farmers. Twenty five were 'Strongly Disagree' with 'The soil testing facilities provided by e-choupal are highly useful in reducing the input costs while, more than sixty five percent respondents were found 'Undecided' about The soil testing facilities provided by e-choupal are highly useful in reducing the input costs. About seventeen percent respondents were 'strongly Agree' on 'the technological information provided by e-choupal are highly relevant to farming system' and 'the technological information provided by e-choupal are suited for both big and small farmers 'respectively. Thirty five percent respondents were found 'Agree' on 'the technological

Table 1: Satisfaction of Farmer towards Provision of Appropriate Technological Information (N=120)

S.No.	Statements	SA	A	UD	DA	SDA
1	Technological information provided by e-choupal are highly relevant to your farming system	16.7	63.3	15.0	-	5.0
2	Technological information provided by e-choupal is cost effective	10.0	35.0	21.7	18.3	15
3	Technological information provided by e-choupal are suited for both big and small farmers	16.7	60.0	18.3	-	5.0
4	Technological information provided by e-choupal has increased your yield and income	11.7	40.0	26.7	11.6	10
5	Technological information provided by e-choupal are highly sustainable	8.3	41.7	36.7	8.3	5.0
6	The soil testing facilities provided by e-choupal are highly useful to you in reducing the input costs	-	5.0	63.3	6.7	25.0
	Average	**10.6**	**40.8**	**30.3**	**7.5**	**10.8**

Figure 1: Satisfaction of farmers with supply of proper inputs by e-choupal



information provided by e-choupal is cost effective' but in contrast 18.30 per cent respondents were 'Disagree on this. As per average satisfaction towards 'Provision of appropriate technological information about forty one percent respondents were found 'Agree'.

Figure 1 depicts that same number of respondents were found 'Agree' and 'Undecided' that e-choupal provides all the needed inputs like seeds, fertilizers and plant protection chemicals while about thirty seven percent 'Strongly agree' on that the inputs supplied from e-choupal were of good quality whereas 28.30 per cent Agree that over the inputs supplied through e-choupal were comparatively cheaper. Figure 2 reveals that thirty per cent and little less were 'Strongly agree' and undecided as well on average satisfaction towards supply of proper inputs by e-choupal. As per the Figure 3 majority (78.3%) of the respondents 'Strongly agree' that if crops are marketed through e-choupal, the transaction cost is less followed by 76.70 percent who also 'Strongly agree' on The ITC procurement system has greatly reduced the transaction time. Maximum (62.5%) respondents were 'Strongly agree' on average satisfaction towards transaction of crops (Figure 4).

Table 2 dealing with price info and improved marketing practices reveal that more than seventy five percent respondents were 'Strongly agree' over the bench mark price set by ITC for crops procurement is comparatively higher than any other agencies followed by 76.70 per cent who were 'Strongly agree' upon the market price provided by e-choupal helps them to analyze the market trends thereby increasing the sale value of the crop produce. In line to above, 62.50 per cent 'Strongly

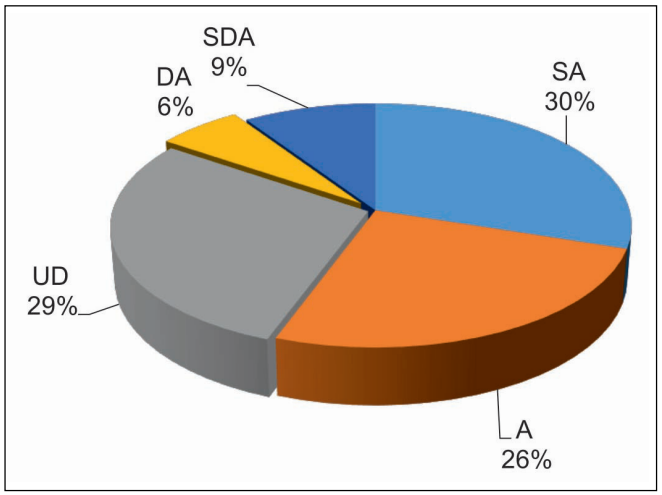


Figure 2: Average satisfaction towards Supply of Inputs

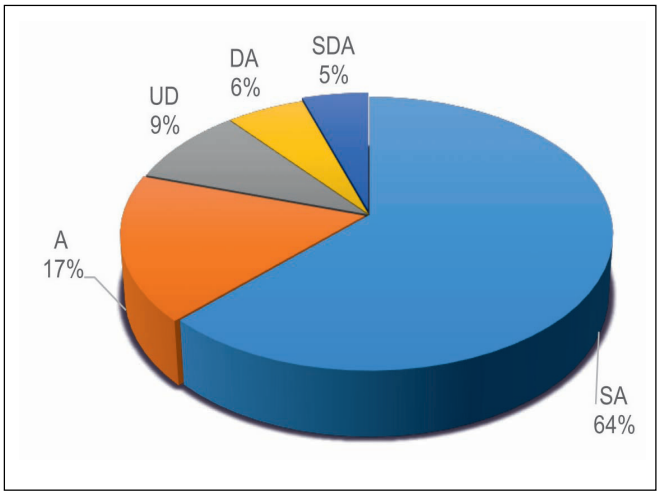


Figure 3: Average satisfaction towards transaction of crops

Figure 4: Satisfaction of farmers with transaction of crops

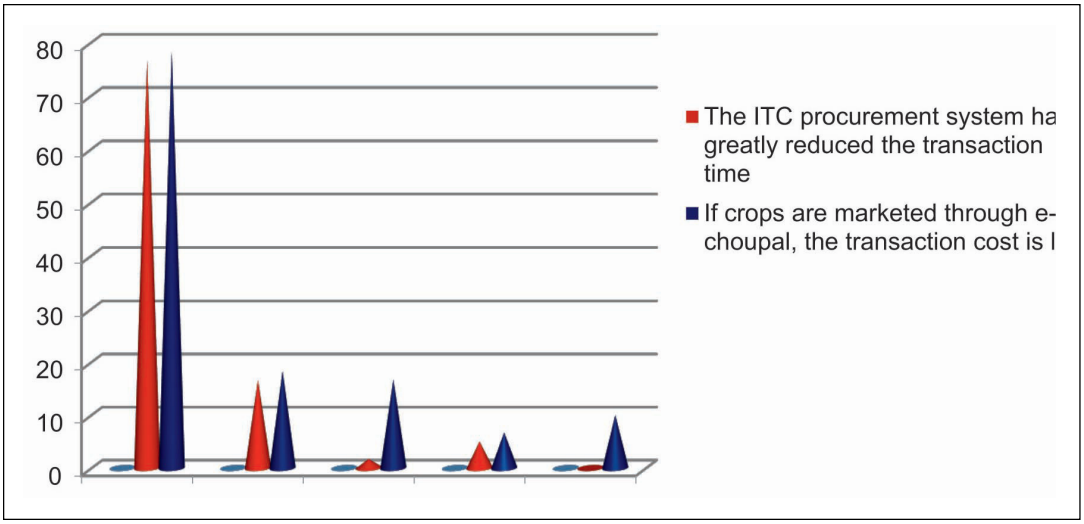
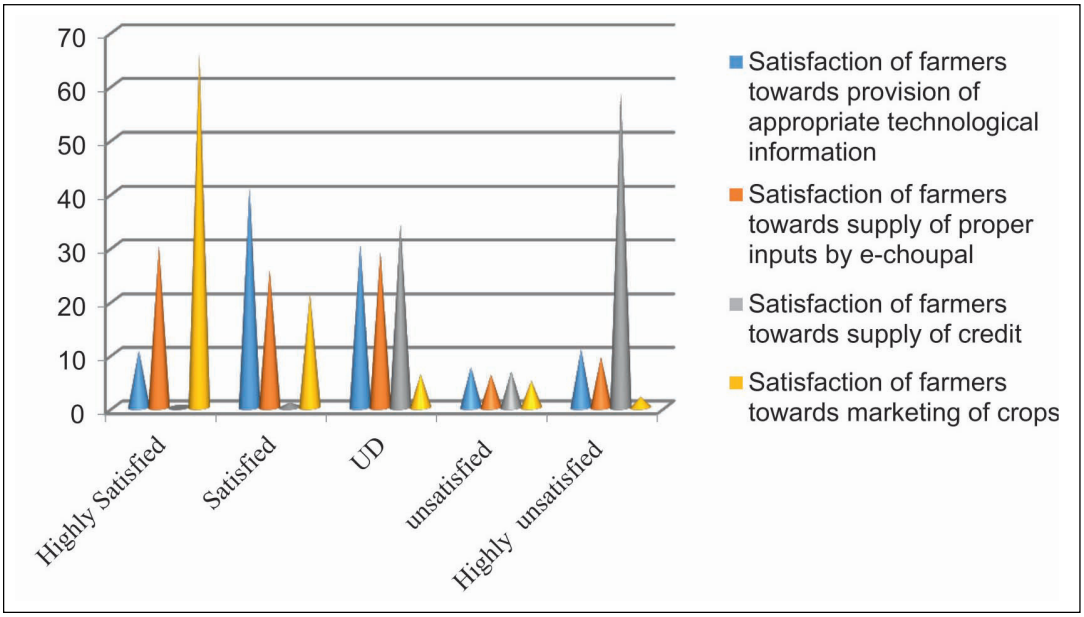


Figure 5: Overall satisfaction of farmers towards the services of e-choupal



agree' towards average satisfaction towards prize info provided by e-choupal. Maximum (85%) respondents were 'Strongly Agree' on the e-choupal make them feel good and happy as it performs the quality tests like measuring moisture content, weighing in electronic balance right in front of them followed by Seventy five percent respondents who were 'Strongly agree' on the ITC treats them as a customer with great respect while 25.00 per cent were 'Agree' upon the statement whereas, no any respondents reported disagreement. Further a little less than seventy percent found 'Strongly agree' on in terms of marketing of produce e-choupal is better than any other agency followed by 66.70 per cent who were 'Strongly agree' over that the payment of full cash immediately after selling the produce greatly helps them to take up further activities. Thus 73.8 per cent respondents were 'Strongly Agree' on improved marketing practice.

Data reflected with Figure 5 states that about forty one per cent respondents found highly satisfied towards provision of appropriate technological information while about fifty eight percent respondents were highly unsatisfied towards supply of credit. On the other hand more than sixty five per cent respondents were reported highly satisfied towards marketing of crops.

The level of overall satisfaction of farmers towards the services of e-choupal is presented in Table 3. It reveals that maximum 50.00 per cent respondents have medium

Table 2: Satisfaction of respondents towards Price Info and improved marketing practices Provided by e-choupal (N=120)

S.No.	Statements	SA	A	UD	DA	SDA
Price Info provided by e-Choupal						
1	The market price provided by e-choupal helps you to analyze the market trends thereby increasing the sale value of the crop produce	76.7	16.6	1.7	5.0	-
2	The bench mark price set by ITC for crops procurement is comparatively higher than any other agencies	78.3	18.3	16.7	6.7	10.0
	Average	**62.5**	**17.4**	**9.2**	**5.9**	**5.0**
Improved marketing practice						
1	The e-choupal makes you feel good and happy as it performs the quality tests like measuring moisture content, weighing in electronic balance right in front of you	85.0	15.0	-	-	-
2	In terms of marketing your wheat produce e-choupal is better than any other agencies	68.3	25.0	6.7	-	-
3	The payment of full cash immediately after selling the produce greatly helps you to take up further activities	66.7	28.3	5.0	-	-
4	The ITC treats you as a customer with great respect	75.0	25.0	-	-	-
	Average	**73.8**	**23.3**	**2.9**	-	-

Table 4: Level of overall satisfaction of farmers towards the service of e-choupal

S.No.	Dimensions	Level of satisfaction (% respondents)				
		Very high	High	Medium	Low	Very low
1	Satisfaction of farmers towards provision of appropriate technological information	10.0	30.0	50.0	5.0	5.0
2	Satisfaction of farmers towards supply of proper inputs by e- choupal	5.0	3.3	66.7	13.3	11.7
3	Satisfaction of Farmers towards supply of credit	13.4	10.5	5.8	20.1	50.2
4	Satisfaction of farmers with respect to marketing of produce	41.7	51.7	6.6	-	-

level of satisfaction towards provision of appropriate technological information followed by 41.7 per cent respondents who were found highly satisfied with respect to marketing of produce. Majority about sixty seven percent respondents were medium level satisfied with supply of proper inputs by e-choupal but in contrast half of the respondents under study were highly un satisfied with supply of credit.

CONCLUSION

The study shows that e-choupal is an effective web based information and procurement system to improve the overall profit of the farmers. The e-choupal system is a good example of market-led extension strategy. Though the farmers were accessing various services from e-choupal, the market price information was found to be the most important service in demand. Maximum 50.00 per cent respondents have medium level of satisfaction towards provision of appropriate technological information followed by 41.7 per cent respondents who were found highly satisfied with respect to marketing of produce while, about fifty eight percent respondents were highly unsatisfied towards supply of credit. The e-choupal has helped the farmers to have access to market price information and marketing infrastructure for sale of the produce. Farmers were not very much interested in getting improved agronomic practices, but they found e-choupal useful with regard to facilities created for

procurement of the produce and provision of market information. The overall impact of e-choupal was varies very high to very low for the services provided, Therefore, e-choupal has got lot of scope to improve its effectiveness. The study showed that the most satisfactory service of e-choupal was with regard to market information and making arrangement for procurement based upon the quality of produce. Therefore, in coming days the extension approach should be market-led for its success. It is suggested that some features related to credit should be added to make it more useful.

Paper received on : April 05, 2020
Accepted on : April 16, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (61-65)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Perceived Effectiveness of Indigenous Technical Knowledge (ITK) in Modern Agriculture in Haryana State

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ABSTRACT

India is a country of many aboriginal communities, with unique traditional knowledge. These traditional knowledge and technologies have played a significant role in the development of the communities. To find out the perception of the modern farmers about the value and effectiveness of the ITKs in today's agriculture a study was carried out in two districts Haryana state namely, Karnal and Sirsa by interviewing 60 farmers from each district. It was observed that the use of compost, neem leaves, biogas slurry and ash were ranked at top as they were perceived to be very effective and popular methods of ITK. The use of egg shells bone meal, crop rotation, use of alcohol, growing pest repelling plants, dhatura, chilli, cowpathy, use of barriers and traps, growing only native plants, talex of aak, tobacco, kerosene oil and garlic followed in series. Other ITKs like use of canola oil, amritpani, castor oil, engine oil, soap, karanj seeds, buttermilk, garlic, limonene and vinegar were not known by the farmers. This indicates that the modern farmers didn't much rely on the ITKs due to the availability of chemical fertilizers and pesticides in market and also because there is lack of awareness among them about certain ITKs thus, there is an urgent need of documenting and preserving the Indigenous Technical Knowledge, many of which are at the edge of extinction. There is also lack of proper links between the practice of indigenous and modern knowledge and technologies which can be a reason for the losing faith of modern farmers in their traditional knowledge.

Keywords: ITK, Mass media exposure, Change proneness, Pesticides, Fertilizers

INTRODUCTION

Indigenous Technology Knowledge (ITK) refers to the unique traditional local knowledge existing within and developed around the specific conditions by women and men indigenous to a particular geographic area (Grenier, 1998). It put greater emphasis on minimizing risks rather than maximizing profit. The traditional knowledge focuses on preventative measures rather than curative, they are dependent on long-range planning. But in today's modern world the indigenous technical knowledge is losing its importance and farmers have started relying more on new scientific techniques and chemical ways of farming. Though many of the modern farming techniques are based on the centuries old traditional ways, the modern farmers find the conventional method to be more easy and effective to carry out. It is important to study the perception as this will enable us to understand why the modern farmers abandoned the indigenous technical knowledge and depend highly on conventional methods of agriculture. Thus a study on the perception of farmers about the effectiveness of ITK in today's agriculture was conducted.

METHODOLOGY

The study was conducted in Haryana state which is geographically located at 30.73° N and 76.78° E. Two

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districts namely Karnal and Sirsa, were selected purposively as they consumed highest amount of agrochemicals in entire state. From each districts six villages were selected. From Karnal; Pabana Hassanpur (Gharaunda), Padhana (Nilokhedi), shyamgardh (Nilokhedi), Gangar (Nilokhedi), Chapra Kheda Rasoolpur (Karnal) and Phoosgardh (Karnal) were selected. From Sirsa district; Rupana Khurd (Chopta), Bakriyawali (Chopta), Panihari (Sirsa), Kheja Kheda (Sirsa), Shahpur begu (Sirsa) and Farwain khurd (Sirsa) were selected. From each village ten farmers were selected randomly. Thus a total number of twelve villages and one hundred twenty farmers were selected for the study. The change proneness was measured by using the scale developed by Moulik (1965). The responses were checked by reading the statement of change proneness. In order to access the extent of use of mass media by the respondent, different mass media were listed and respondents were asked to how often they used these mass media. The scoring pattern was adopted as of Bhatti (1985).

RESULTS AND DISCUSSION

Majority (53.57%) of farmers belonged to middle age group, 30 per cent educated up to matriculation and 83.57 per cent of farmers were engaged only in farming. Table 1 highlights that majority of the respondents in both the districts i.e. 92.50 per cent in Karnal and 88 per cent in Sirsa had high level of the change proneness. It shows that most of the respondents had very high tendency to adopt any new technology introduced to them. It is apparent that they may use every new fertilizers or pesticides introduced in market, ignoring the traditional methods which require lot of efforts and show late results. High proneness to change may be one of the reasons why farmers has abandoned the ITK and adopted modern agricultural practices.

Table 1: Proneness to change in farmers

Category	Karnal (%)	Sirsa (%)
Low (<6)	00.00	00.00
Medium (6 to 12)	07.50	12.00
High (>12)	92.50	88.00

Mass media plays an important role in the transfer of technology from technocrats to farmers. Particularly when a farmer is not able to contact an extension agent frequently, media comes to rescue to some extent by bringing the required information to the farmers. The more the exposure of farmers to mass media, more would be the gain in knowledge and information. But it has been observed that the TV, radio, newspaper and other sources mostly promote the modern technologies and not the traditional ones. Hence, it is clear that the farmers were more aware of the modern technologies rather than the old ones, thus adopting them. Under the present study although the mass media exposure was low, the farmers used TV, radio and newspaper as a source of information. It could be illustrated from Table 2 that in Karnal district, from all the mass media, TV was ranked 1st with weighted mean score of 1.1, followed by newspaper (0.65), radio (0.55), internet (0.08), magazine (0.07) and KVK (0.03), whereas, in Sirsa district, TV (0.95) ranked 1st followed by radio (0.67), newspaper (0.53) and KVK (0.28). It was observed that the farmers in Sirsa district did not use magazine, internet and farmers of both the districts never attended any workshop.

Conventional agriculture involves use of chemical fertilizers, pesticides, insecticides, herbicides, fungicides and various other types of agrochemicals. The deliberate use of these agrochemicals can adversely affect human and environmental health. Thus there is urgent need of choosing a method which is preventive rather than curative. Our ancestors had immense knowledge that was evolved within the local (grassroots) community and is being passed on from one generation to another,

Table 2: Mass media exposure of farmers

S. No.	Mass media exposure	Karnal (WMS)	Karnal (Rank)	Sirsa (WMS)	Sirsa (Rank)
1.	Radio	0.55	3	0.67	2
2.	TV	1.10	1	0.95	1
3.	Newspaper	0.65	2	0.53	3
4.	Workshop	0.00	7	0.00	5
5.	Magazine	0.07	5	0.00	5
6.	KVK	0.03	6	0.28	4
7.	Internet	0.08	4	0.00	5

encompasses not only local or indigenous knowledge, but also scientific and other knowledge gained from outsiders. The implementation of those knowledge and practices can prevent the environmental degradation leading to sustainable development. Thus it was felt important to know what the modern farmers perceive about indigenous technical knowledge. A list of fertilizers (Table 3) that were used in traditional farming system was prepared and the farmers were asked about their effectiveness and their responses were arranged rank-wise. In Karnal district, green manuring (Fageria, 2007), poultry litter/ manure (Boateng *et al*., 2006), organic manure, compost/ vermicompost (Adhikari, 2012), spent compost, bio-gas slurry and ash were ranked 1st as all the farmers mentioned them to be most effective fertilizers. Use of egg shells (Nikose, 2015) was ranked 2nd with weighted mean score (3.9) followed by bone meal (3.7) (Kivela *et al.*, 2015) and organic fertilizers (3.6). In Sirsa district, use of compost/ vermicompost, spent compost, bio-gas slurry and ash were ranked 1st with weighted mean score of 4. Green manuring, poultry litter/manure, organic manure and egg shells were ranked 2nd with weighted mean score of 3.8. Organic fertilizers were ranked 3rd and bone meal was ranked 4th with weighted mean score of 3.6 and 3.4, respectively.

Among various pesticides used in ITK system, use of neem leaves (Lokanadhan *et al.,* 2012), was ranked 1st with weighted mean score as 4 followed by alcohol (Aristizabal *et al*., 2016) and growing pest repelling plants as 2nd with weighted mean score as 3.1. Dhatura (2.8) (Kuganathan *et al*., 2007) was ranked 3rd followed by cowpathy (Khan *et al., 2015)* & chilli (2.6) (Varghese and Mathew, 2012) and biological control (2.3). Using barriers and traps, growing only native plants, trees and grasses and using latex of *Aak* plant were ranked 6th. Use of tobacco (2.1) was ranked 7th, kerosene oil (1.9) was ranked 8th, physical control & use of garlic (1.7) was ranked 9th and use of butter milk (1.5) was ranked 10th. Use of hormones/ pheromones was ranked 11th. Use of limonene, castor oil, canola oil, engine oil, soap, karanj and apple cider/vinegar was felt non-effective by all the farmers. In Sirsa district, use of neem leaves ranked 1st with weighted mean score as 4 followed by growing pest repelling plants (3.1), alcohol & dhatura (2.8), cowpathy & chilli (2.6). Use of barriers and traps, growing only native plants, trees and grasses and latex of *Aak* plant were ranked 5th with weighted mean score of 2.2. Biological control, tobacco and kerosene oil were ranked 6th with weighted mean score of 1.9. Use of garlic was ranked 7th followed by physical control and use of butter milk with weighted mean scores of 1.7, 1.6 and 1.4. Hormones/pheromones with weighted mean (1.2) was ranked 10th followed by using soap. Use of limonene, castor oil, canola oil, engine oil, karanj and apple cider/ vinegar was felt non-effective by all the farmers (Table 4).

Table 3: Perception about the effectiveness of various fertilizers used in ITK system

S.No.	Fertilizers	Karnal		Sirsa		Extension functionaries	
		WMS	Rank	WMS	Rank	WMS	Rank
1.	Green manuring	4.00	1	3.80	2	4.00	1
2.	Poultry litter/ manure	4.00	1	3.80	2	4.00	1
3.	Organic manure	4.00	1	3.80	2	4.00	1
4.	Compost/vermicompost	4.00	1	4.00	1	4.00	1
5.	Spent compost	4.00	1	4.00	1	4.00	1
6.	Bio-gas slurry	4.00	1	4.00	1	4.00	1
7.	Ash	4.00	1	4.00	1	3.70	2
8.	Egg shell	3.90	2	3.80	2	1.70	4
9.	Bone meal	3.70	3	3.40	4	1.90	3
10.	Organic fertilizers	3.60	4	3.60	3	4.00	1

Table 4: Perception about effectiveness of pesticides used in ITK system

S.No.	Pesticides	Karnal		Sirsa	
		WMS	Rank	WMS	Rank
1	Neem leaves	4.00	1	4.00	1
2	Alcohol	3.10	2	2.80	3
3	Growing pest repelling plants	3.10	2	3.10	2
4	Dhatura	2.80	3	2.80	3
5	Cowpathy	2.60	4	2.60	4
6	Chilly	2.60	4	2.60	4
7	Biological control	2.30	5	1.90	6
8	Barriers and traps	2.20	6	2.20	5
9	Growing only native plants, trees and grasses	2.20	6	2.20	5
10	Latex of *Aak* plant (*Calotripis gigantea*)	2.20	6	2.20	5
11	Tobacco	2.10	7	1.90	6
12	Kerosene oil	1.90	8	1.90	6
13	Physical control	1.70	9	1.60	8
14	Garlic	1.70	9	1.70	7
15	Butter milk	1.50	10	1.40	9
16	Hormones/ pheromones	1.20	11	1.20	10
17	Limonene	1.00	13	1.00	12
18	Castor oil	1.00	13	1.00	12
19	Canola oil	1.00	13	1.00	12
20	Engine oil	1.00	13	1.00	12
21	Soap	1.00	13	1.10	11
22	(*Pongamia Pinnata*) Karanj	1.00	13	1.00	12
23	Apple cider/ vinegar	1.00	13	1.00	12

CONCLUSION

It can be concluded that farmers in both the districts had high proneness to change but had low level of mass media exposure. Perception about effectiveness of various fertilizers used in ITK system revealed that green manuring, poultry litter/manure, organic manure, compost/ vermicompost, spent compost, bio-gas slurry and ash were observed to be most effective. Pesticides used in ITK system like neem leaves, pest repelling plants, alcohol, dhatura, cowpathy & chilli were considered to be most effective. The farmers were not much aware about the indigenous technical knowledge and perceived to be not very effective method of practicing agriculture. Thus there is need of awareness creation and educating farmers that our traditional knowledge system has great potential of practicing agriculture without disturbing the ecological balance. There is an instant need of documenting and preserving the Indigenous Technical Knowledge, many of which are at the edge of extinction. There is also lack of proper links between the practice of indigenous and modern knowledge and technologies. By building a bridge between modern and traditional knowledge better agriculture can be performed along with clean, green and safe environment to live and flourish in.

Paper received on : April 17, 2020
Accepted on : April 29, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (66-69)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

A Study on Indigenous Technical Knowledge of Tribal Farmers in Agriculture and Livestock Sectors of Koraput District

Sasanka Lenka[1]* and Abhijeet Satpathy[2]

ABSTRACT

Indian people are living in varied agro-climatic situations with rich cultural values in diversified societies. Several experiments are being taken by the tribal farmers since long on trial and error basis on agriculture and allied activities to overcome the specific problems or adverse situations in their respective areas. Indigenous technical knowledge system consists of an integrated body of knowledge system which tends to focus on different aspects of agricultural sciences i.e. agriculture, animal husbandry, and natural resource management. The paper is focused on the documentation of various Indigenous Technical Knowledge (ITK) of tribal farmers in agriculture and animal husbandry sectors. Odisha is a state populated by several indigenous communities, most of which have their own set of unique traditional knowledge and technology base. The majority of the tribal farmers had a favorable attitude towards Indigenous Technical Knowledge in the agriculture and livestock sectors. It is a key element of the social capital of the poor and constitutes their asset in their efforts to gain control of their own lives. The flow of indigenous knowledge communication is necessary for the preservation, development, and sustainability of local wisdom. It can be concluded that about 56 per cent of agricultural ITKs are rational against 44 per cent are non-rational. Similarly, 62 per cent of ITKs found in the livestock sector are rational against 38 per cent are non-rational. The rate of adoption in livestock ITKs was 75 per cent and for agriculture 65.72 per cent showing significantly higher rate of adoption in livestock than agriculture. Mainly the farmer's traditional knowledge is vital for all the well-being categories for sustainable development as it has evolved after thousands of years of observation and experience. ITKs being low in cost, it will also benefit the national economy besides sustainable agricultural development.

Keywords*:* Agricultural extension, Indigenous Technical Knowledge (ITK), Documentation and validation

INTRODUCTION

India over several millenniums has been the treasure land of biological wealth, intellectual knowledge and spiritual wisdom. Indian people are living in varied agro-climatic situations with rich cultural values in diversified societies. Several experiments are taken by the farmers since long on trial and error basis on agriculture and allied activities to overcome the problems or adverse situations. The knowledge generated over the years is time-tested and has many attributes of eco-friendliness to farmers and nature. Such knowledge is called the "Indigenous Technological Knowledge (ITK)" or "local knowledge "or "traditional knowledge". Indigenous Technical Knowledge (ITK) has enormous innovation potential, especially at the grassroots level. India is the home of indigenous communities, most of which have their own set of unique traditional knowledge and technology base. Many of this knowledge and technologies are at par with the modern knowledge and technology system and helping the indigenous communities with comfort and self-sufficiency. These traditional knowledge and technologies

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have played a significant role in the overall socio-economic development of the communities.

India's ancient scriptures consisting of 4 Vedas, 108 Upanishads, 2 epics, Bhagwad Gita, Brahmasutras, 18 Purana, Manusmriti, Kautilya Shastra and Smritis as well as the teachings of innumerable sayings, proverbs and sages contain profound literature of ideas, concepts and practices which are designed to address the process of building harmonious relationship among man, animal and nature. India has more than 1000 species of plants are known to have insecticidal properties, 300 species with repellent properties, 30 species possessing insect growth regulatory (IGR) properties and there is wide scope for use of organic manures which can be prepared from plant parts as well as animal byproducts. The enhancement of the quality of life of the Indians who in great majority live in and depend on agricultural production systems would be impossible by keeping this rich tradition of ITK aside. India is classified among the 12 mega diversity centers of the world, concerning crops. As many as 167 species of crops, 320 species of wild crop relatives and several species of domesticated animals have originated here. The genetic diversity within these species is astounding. Some examples are rice (50,000 varieties), sorghum (5000 varieties), mango (1000 varieties), pepper (500 varieties), cattle (27 breeds), goat (22 breeds), sheep (40 breeds), poultry (18 breeds) and Buffalo (8 breeds). This amazing diversity is not a freak of nature, but a result of careful selection and even crossbreeding over centuries by India's farmers and pastoralists. Hence, Indian agriculture, to such an extent, is much traditional and dates back to about 10,000 years.

Interest in Indigenous Technical Knowledge (ITK) has been fueled by the recent worldwide ecological crisis and the realization that its causes lie partly in the over-exploitation of natural resources based on inappropriate attitudes and technologies. Scientists are now recognizing that indigenous people have managed the environments in which they have lived for generations, often without significantly damaging local ecologies. Many feel that indigenous knowledge can thus provide a powerful basis from which alternative ways of managing resources can be developed. The present paper attempted to identify and document the Indigenous Technical Knowledge of tribal farmers in the agriculture and livestock sectors and documented the farmers' coping mechanisms to overcome the constraints identified.

METHODOLOGY

The study was conceived on the theoretical premise that a man tries to adapt to the environment in which he lives and derives his livelihood, he improves his knowledge, skills, and strategies to harness natural resources in a sustainable manner. The knowledge and skills are derived from man's daily interactions with the environment, observations, and experiments. They greatly shape and model the decisions made by people regarding the exploitation of resources. The knowledge, skills, and practices relating to natural resources are passed down to generations through the cultural learning process. It is the outcome of all these among different groups and the environment that is termed as indigenous, local, traditional or people's knowledge. Indigenous knowledge in this study refers to the knowledge which is native to the farmers. This knowledge system is however not exclusive but can be modified with time and requirement, whereas modern knowledge referred to concepts, ideas, values, beliefs which are imparted in the minds of the native by extension workers who are trained in scientific agriculture.

Explorary research design was followed for the study. The steps were taken to accomplish the task included the use of a more qualitative approach. The research design was employed to conduct the cross-sectional survey and the method was deemed suitable because it enabled the required information to be collected on several pre-determined variables of a single point in time and from a cross-section of the fairly uniform group. The district was purposively selected as it is a tribal-dominated district of the state. The study was conducted in 10 tribal villages of Potangi and Semiliguda blocks in Koraput district. From the ten selected villages, 20 farmers from each village were selected, thus making a total of 200 respondents for the study. While technological developments are pivotal in a change in agenda, overall changes that have been taking place in the agricultural and animal husbandry sectors were described. To

synthesize farmers' practices and experiences to draw the useful lessons required participating in, and following several iterative steps. Researchers, extension officers, and district level officials jointly developed checklists with open-ended questions and administered through individual interviews with five key informants and farmers. Purposive sampling was used in selecting 20 farmers from each village basing on their knowledge of the subjects as well as their policy-making and implementation roles.

RESULTS AND DISCUSSION

The tribal culture is so much generous and simple. A deep observation, study, and analysis regarding tribal culture and traditional knowledge will clarify our understanding. Although modernization and the process of globalization have already entered into the hills of the Koraput region changing their lifestyle; yet their costumes, traditionally associated with cultural history will remain evergreen in the vicinity. The technologies developed by the tribal farmers are based on the topography, local agro-climatic conditions, and available resources through non-formal experiments. Mainly the ITKs were confined to agriculture and livestock sectors in all selected villages of the Koraput district. The agriculture sector covered agriculture & natural resource management (nrm), rice, greengram, and groundnut. similarly, in the livestock sector cattle, sheep & goat and poultry bird were covered.

It could be seen from the Table 1 that 63 ITKs were documented across the villages, out of which 35 ITKs which accounts for 55.55 per cent were found rational and 28 ITKs were non-rational. Among all the ITKs, 34.92 per cent of the ITKs were related to agriculture and Natural Resource Management followed by 18 ITKs related to rice crop accounted 28.58 per cent, greengram accounted 19.04 per cent and only 11 ITKs are related to groundnut which was only 17.46 per cent. It shows that the more ITKs on a particular crop shows the importance given by the farmers to the crop. Further, 39 ITKs were documented in all selected villages under the animal husbandry sector. Out of 39 ITKs, 24 ITKs are rational, which accounts for 61.53 per cent and 15 ITKs were found non-rational. Among all the ITKs, 43.60 per cent of the ITK's were related to the cattle; nearly the equal 28.20 per cent of the ITK's were related to sheep & goat and poultry birds respectively. Chandola *et al.* (2011); Chinlampianga (2011); Dey and Sarkar (2011); Ellis and Wang (1997); Manna *et al.* (2011) and Nayak *et al.* (2011) also reported different ITKs related to agriculture and allied sectors in different settings.

It reveals from the Table 2 that the majority of the rational ITKs (65.72%) were adopted by the farmers in all the selected villages. Similarly, about 34.28 per cent of non-rational ITKs were also adopted by the farmers in the district. The extension system while encouraging the adoption of rational ITKs should educate the farmers to discontinue the non-rational ITKs. It could also be seen from the table that 18 rational ITKs were adopted by the farmers across all the villages which contribute 75 per

Table 1: ITKS documented in Agriculture and Animal Husbandry

Main area of ITK	Number of ITK documented	Percentage	Number of Rational ITK	Percentage of R. ITK	Number of non-rational ITK
Agriculture					
Agriculture & NRM	22	34.92	12	34.29	10
Rice	18	28.58	10	28.57	8
Greengram	12	19.04	7	20.00	5
Groundnut	11	17.46	6	17.14	5
Total / Average	63		35	55.5	28
Animal Husbandry					
Cattle	17	43.60	11	45.83	6
Sheep and Goat	11	28.20	6	25	5
Poultry birds	11	28.20	7	29.17	4
Total / Percentage	39		24	61.53	15

Table 2: Rationality and Adoption of ITK in Agriculture and Animal Husbandry

Main area of ITK	Rationality		Adoption of ITKs	
	Number of ITKs	Percentage	Number of Rational ITKs	Number of non-rational ITKs
Agriculture				
Agriculture & NRM	12	34.29	8	4
Rice	10	28.57	7	3
Greengram	7	20.00	4	3
Groundnut	6	17.14	4	2
Total/Percentage	35	55.5	23 (65.72%)	12 (34.28%)
Animal Husbandry				
Cattle	11	45.83	9	2
Sheep and Goat	6	25	4	2
Poultry birds	7	29.17	5	2
Total/Percentage	24	61.53	18 (75%)	6(25%)

cent and about 25 per cent of the non-rational ITKs were also adopted by the farmers in the district. The extension system while encouraging the adoption of rational ITK should educate the farmers to discontinue the non-rational ITKs in most villages.

CONCLUSION

It can be concluded that traditional knowledge is vital for well-being and sustainable development as it has evolved after thousands of years of observation and experience. ITK is also required to be properly documented for the benefit of researchers, planners and development officials. Validation of ITK is a logical step to qualify and quantify the effectiveness of the practices. Suitable modifications of the local practices, through research and development, will help to develop appropriate and acceptable technologies that are more suited to our farming situations. However, there is still a long distance to cover in scientific validation of Indigenous Agricultural knowledge. Farmers have wealth of knowledge, which eventually does not extinct but transfers from generation to generation on its own strength and influence. It is very important to concretize this experience into a system. Identifying, documenting and incorporating ITK in agricultural extension organization are essential to achieving agricultural development. The participatory technologies that are developed through ITK integration will provide diversified technological options. Indigenous Traditional Knowledge being low in cost will also benefit the national economy besides sustainable agricultural development.

Paper received on : April 28, 2020
Accepted on : May 12, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (70-75)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Awareness Among Rural Youth about Agriculture Related Livelihood Options in Hills of Uttarakhand

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ABSTRACT

Uttarakhand state is blessed with rare biodiversity which gives a great opportunity for diversified farming and horticulture. Regardless of the livelihood options available for hill youth the migration rate have also been high from the hill districts of the state. Low awareness about the agriculture related livelihood options may be one of the reasons behind youth out-migration. Hence, the study was carried out in Tehri Garhwal district of Uttarakhand, with descriptive research design. Two blocks were selected by random sampling and under each block two villages were selected by simple random sampling method. Respondents were taken by census method. The results of the study revealed that out of total eighty five livelihood options related to agriculture and allied sectors, the awareness among rural youth was found to be low on 43 options, medium in the 18 areas and high level of awareness in 24 areas as they were being traditionally cultivated in the area. The outcome of the study may be used by stakeholders to strengthen the information communication network for ultimately providing a sustainable livelihood to the rural youth and to reverse the out-migration from the hills of Uttarakhand.

Keywords: Awareness, Hill-agriculture, Livelihood options, Rural youth

INTRODUCTION

Uttarakhand state was carved out of Uttar Pradesh in the year 2000 for the development of hills as majority of the area of the state falls under hilly area. The state is blessed with the rare bio- diversity and has almost all major climatic zones which make it amenable for agriculture diversification and commercialization of horticulture. Other than this there is a vast opportunities for organic farming, tourism, forest based industries which can give a better source of employment to the people of hill areas. Still the people have to raise their income and quality of life. It has been more than sixteen years since the establishment of the state and still hilly areas strive for employment opportunities and livelihood options due to which rate of migration is high, a major problem of hills today. Among the problems poverty, unemployment, health care facilities, quality of education are major. Other than these, women drudgery is still prevailing in hills and natural disasters and wild life threat also prevails in the area (Pratap, 2011). In rural areas of hills, the major source of livelihood in agriculture as majority of the population is engaged in agriculture and related occupations, but most of them rely on subsistence farming and do not go for diversification of agriculture. One major factor behind is that youth of hill areas show less interest in primary sector for income generation and they migrate to plain areas to search for their source of livelihood, resulting in the increase in the rate of migration (Mamgain, 2004). Due to this, hill agriculture is facing several problems like agriculture degradation, depletion of land and lack of innovations in agriculture. The agriculture universities and

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research institutions working in Uttarakhand have proposed several livelihood options pertaining to the agro-climatic conditions of hilly areas to raise the standard of living of people of hills but it has been perceived that youth of hills are less aware about the livelihood options related to agriculture. Due to this, study was carried with the objective to study the extent of awareness among rural youth of hills about identified livelihood options.

METHODOLOGY

The study was conducted in Tehri Garhwal district of Uttarakhand. Two blocks were selected randomly for the study. Two villages from each block were taken. As the population in the villages of hill area is scattered and the migration rate is also high respondents were selected by census method for the study. Descriptive research design was used. Data was collected through structured interview schedule. Appropriate statistical tools and techniques such as frequency, percentage, arithmetic mean, standard deviation and weighted mean score were used for analysis and interpretation.

RESULTS AND DISCUSSION

According to prepared list of livelihood options related to agriculture and allied sectors awareness of rural youth was found out. In each of the sub sector which has a potential to become an option for livelihood of youth, the awareness was measured. According to calculated weighted mean score, the livelihood options were categorized in three categories of high, medium and low according to the responses given by the respondents for a particular area.

Horticultural crops and medicinal plants

The data in the Table 1 depicts that about information related to cultivation practices of horticultural crops. The result has shown that majority of the youth were found to be fully aware for the cultivation of vegetable pea, French bean, potato, tomato and capsicum, these vegetables are traditionally being grown in the area and not aware about salad, lettuce, celery production, nursery raising and seed production, as these were not grown or consumed in the area. For the cultivation of summer squash and cabbage, medium level of aware was found in majority of the youth. The table further depicts that for exotic fruit production like kiwi fruit, avocado, strawberry and raising nursery, the level of awareness was low. For cultivation of temperate fruits like apple, almonds, production of walnut and apricot kernel for production of oil and for sweet orange production medium level of awareness was found. There was high awareness for walnut, peach and plum and for fruit preservation techniques. The reason behind low level of awareness was due to less exposure of respondents to exotic fruits. Among floriculture production techniques, protected cultivation of flower, nursery raising, hybrid seed production and flower bulb production low level of awareness was shown. For cut flower production and loose flower production medium level of awareness was found. For majority of the areas under medicinal plants such as *Brahmi, Reetha*, piper mint, *Trifala* cultivation the level of awareness among youth was low. For aromatic plants such as lemon grass, citronella, lavender, geranium, medicinal and aromatic plants nursery and oil extraction unit also the awareness was low. Only for basil cultivation there was medium level of awareness among youth. The factor behind low level of awareness was lack of exposure campaigns for youth about these options.

Organic farming and Cereals, millets and pulse production

Data regarding awareness related to organic farming practices is presented in Table 2. According to calculated weighted mean score, the awareness about organic ginger, turmeric, *Arbi,* chilli and garlic cultivation the level of awareness was high as these are the crops traditionally grown in the area and for organic manure production the awareness level was medium. By calculating weighted mean score, it was found that there was high awareness among rural youth about cultivation of coarse cereals, cultivation of maize, cultivation of pulses and coriander cultivation. For soybean, cardamom and *Jakhiya* cultivation the awareness level was low and for processed products of soybean the awareness level was low.

Livestock farming

The data regarding awareness about livestock farming practices is presented in Table 3. The table explains that

Table 1: Distribution of the respondents on the basis of their awareness related to horticultural production system and medicinal plants

Areas	Not aware		Partially aware		Fully aware		Weighted
	F	%age	F	%age	F	%age	mean score
Vegetables							
Cultivation of vegetable pea	2	2.44	9	10.98	71	86.59	2.84
Cultivation of French bean	2	2.44	10	12.19	70	85.37	2.82
Cultivation of Potato	0	0	13	15.85	69	84.05	2.84
Cultivation of tomato	3	3.66	25	30.49	54	65.85	2.62
Cultivation of capsicum	7	8.54	16	19.51	59	71.95	2.63
Cultivation of summer squash	14	17.07	43	52.44	25	30.49	2.13
Cultivation of cabbage	13	15.85	36	43.90	33	40.24	2.24
Nursery raising	42	51.22	29	35.37	11	13.40	1.62
Seed production of vegetable crops	45	54.88	35	42.68	2	2.44	1.47
Salad- lettuce, Celery production	77	93.90	5	6.09	0	0	1.06
Protected cultivation	76	92.68	2	2.44	4	4.88	1.12
Fruit crops production							
Cultivation of temperate fruits (Apple)	11	13.41	38	46.34	33	40.24	2.26
Walnut	0	0	33	41.25	49	59.75	2.59
Almonds	5	6.09	56	68.29	21	25.21	2.19
Peach, Plum	0	0	15	18.29	67	81.71	2.81
sweet orange	0	0	11	13.40	71	86.59	2
Exotic fruit production (kiwi fruit)	69	84.05	12	14.63	1	1.21	1.17
Avocado	75	91.46	6	7.31	0	0	1.06
Strawberry	71	86.59	11	13.40	0	0	1.13
Nursery raising	79	96.34	3	3.66	0	0	1.03
Walnut, Apricot kernel for production of oil	19	23.17	54	65.85	9	10.98	1.87
Fruit preservation (Jam, Jelly, Chutney, Pickle, Juice, candy)	0	0	18	21.95	64	78.05	2.78
Floriculture							
Cut flower production (Rose, Gladiolus, Tube rose)	15	18.29	51	62.19	16	19.51	2.01
Loose flower production (Marigold)	17	20.73	53	64.63	12	14.63	1.93
Protected cultivation of flowers	71	86.59	11	13.40	0	0	1.13
Nursery raising	81	98.78	1	1.22	0	0	1.01
Hybrid seed production	81	98.78	1	1.22	0	0	1.01
Flower bulb production (Lilium, Gladiolus, Chrysanthemum, Tulips)	80	97.56	2	2.44	0	0	1.02
Medicinal plants							
Medicinal plant cultivation: *Brahmi*	48	58.37	33	41.25	1	1.21	1.42
Reetha cultivation	45	54.88	35	42.68	2	2.44	1.47
Tulsi cultivation	10	12.19	20	24.39	52	63.41	2.51
Mint, Piper-mint	70	85.36	10	12.19	2	2.44	1.17
Aromatic plant cultivation (Lemon grass)	74	90.24	8	9.75	0	0	1.09
Citronella cultivation	73	89.02	9	10.97	0	0	1.10
Lavender cultivation	74	90.24	8	9.75	0	0	1.09
Geranium cultivation	73	89.02	9	10.97	0	0	1.10
Trifala making (cultivation of *Harar, Bahera, Amla*)	69	84.05	12	14.63	1	1.21	1.17
Medicinal and aromatic plants nursery	79	96.34	3	3.66	0	0	1.03
Oil extraction unit	77	93.90	3	3.66	2	2.44	1.08

Table 2: Distribution of the respondents on the basis of their awareness related to organic farming and Cereals, millets and pulse production (n=82)

Areas	Not aware		Partially aware		Fully aware		Weighted
	F	%age	F	%age	F	%age	mean score
Organic farming							
Organic Ginger cultivation	7	8.54	40	48.78	35	42.68	2.34
Turmeric cultivation	9	10.98	21	25.61	52	63.41	2.52
Arbi cultivation	8	9.75	20	26.83	54	65.85	2.56
Chilli cultivation	6	7.31	23	28.05	53	64.63	2.57
Garlic cultivation	7	8.54	22	26.83	53	64.63	2.56
Organic manure production/ bio-fertilizer production	27	32.93	35	42.68	20	24.39	1.91
Cereals, millets and pulse production							
Cultivation of coarse grains (Buckwheat, barnyard millet, Finger millet, Amaranthus)	4	4.88	3	3.66	75	91.46	2.86
Cultivation of Maize	3	3.66	4	4.88	75	91.46	2.87
Cultivation of pulses (*Naurangi*, Kidney bean, Pigeon pea, *Gehat, Bhatt*)	0	0	4	4.88	78	95.12	2.95
Soybean cultivation	9	10.98	66	83.49	7	8.54	1.97
Soybean processing (Paneer, milk, Tofu)	73	89.02	8	9.75	1	1.21	1.12
Cardamom cultivation	46	56.09	28	34.15	8	9.75	1.53
Coriander cultivation	7	8.54	27	32.93	48	58.37	2.50
Jakhiya cultivation	47	57.32	26	31.70	9	10.98	1.59

Table 3: Distribution of the respondents on the basis of their awareness related to livestock farming (n=82)

Areas	Not aware		Partially aware		Fully aware		Weighted
	F	%age	F	%age	F	%age	mean score
Dairy farming (dairy products: ghee, butter, butter milk)	0	0	8	9.75	74	90.28	2.90
Fodder crop production	1	1.21	14	17.07	67	81.70	2.80
Goat rearing	2	2.44	13	15.85	67	81.70	2.79
Sheep rearing	3	3.66	14	17.07	65	79.27	2.75
Wool making	25	30.49	44	53.66	13	15.85	1.85
Bio-gas production	6	7.32	40	48.78	36	43.90	2.36
Buffalo farming	2	2.44	16	19.51	64	78.05	2.75
Silage production	2	2.44	11	13.40	69	84.05	2.81
Angora rabbit farming	62	75.61	17	20.73	3	3.66	1.28

there was high awareness about dairy farming, fodder crop production, goat rearing, bio- gas production, buffalo farming and silage production and medium level of awareness about sheep rearing and wool making. For Angora rabbit farming the level of awareness was found low.

Other crops and income generating options

According to weighted mean score, all three areas under mushroom cultivation (button mushroom production, oyster mushroom production and compost making) were found under low level of awareness. Similarly, for honey

Table 4: Distribution of the respondents on the basis of their awareness related to other crops and income generating options (n=82)

Areas	Not aware		Partially aware		Fully aware		Weighted
	F	%age	F	%age	F	%age	mean score
Button mushroom production	73	89.02	5	6.09	4	4.88	1.15
Oyster mushroom production	73	89.02	5	6.09	4	4.88	1.15
Compost making	72	87.80	6	7.32	4	4.88	1.17
Honey production	78	95.12	4	4.88	0	0	1.04
Value added products	78	95.12	4	4.88	0	0	1.04
Vermi- Compost production	66	80.49	11	13.4	5	6.09	1.25
Worms production	66	80.49	11	13.4	5	6.09	1.25
Broiler production	35	42.68	21	25.61	26	31.70	1.89
Egg production	35	42.68	21	25.61	26	31.70	1.89
Backyard poultry farm	30	36.59	27	32.93	15	18.29	1.57
Mulberry silk worm rearing	75	91.46	7	8.53	0	0	1.08
Mulberry nursery raising/ planting material production	32	39.02	40	48.78	10	12.19	1.48
Silk production/ silk yarn making	78	95.12	4	4.88	0	0	1.04
Fibre crop production (Ringal)	54	65.85	28	34.15	0	0	1.34
Fibre extraction	74	90.24	6	7.32	2	2.44	1.12
Cultivation of oil seeds (Sarson)	9	10.98	38	46.34	35	42.68	2.31
Oil extraction unit	77	93.90	5	6.09	0	0	1.06
Tea cultivation	78	95.12	4	4.88	0	0	1.04
Tea making unit	78	95.12	4	4.88	0	0	1.04
Timber trees (pines, *Deodar, Semal*)	1	1.21	17	20.73	64	78.05	2.19
Fuel wood (Acacia, *Kharsu, Moru*)	0	0	25	30.49	57	69.51	2.29
For fodder purpose (*Bhimal, Baanj*)	1	1.21	31	37.80	50	60.98	2.34

production and value added products the awareness of rural youth was low, the probable reason behind may be lack of training programmes for youth about these ventures (Table 4). The level of awareness for vermi compost production and for worm production was found low due to the less participation of youth in training programmes related to these ventures. The table also depicts that for backyard poultry farming the level of awareness was low and for broiler production and egg production the level of awareness was in medium category. The awareness for mulberry silk worm rearing, mulberry nursery raising and silk production was low. The possible reason behind lack of awareness may be due to lack of awareness campaigns by extension agencies about these options. Awareness related to fisheries was found low and the probable reason behind this was that the less prevalence of this option in the research area. Similarly, for fibre crop production, fibre extraction, oil extraction unit of oil seed crops, tea cultivation and tea making unit which can be a viable livelihood option, the awareness among rural youth was low. For cultivation of mustard the awareness was found to be of medium level as this is the major crop grown in the area. For forest based options such as timber trees (pines, *Deodar* and *Semal*) for fuel wood (Acacia, *Kharsu, Moru*) and for fodder purpose (*Bhimal, Baanj*), the rural youth had medium level of awareness. Out of total eighty five livelihood options identified for the area,

low awareness was found for 43 areas, medium awareness for 18 areas. Only about 24 livelihood options the awareness level was high.

CONCLUSION

Out of these options the awareness among rural youth of Tehri Garhwal district was found to be low (43 options) medium level of awareness was found in the eighteen areas. Twenty four areas were having high level of awareness as they were being traditionally cultivated in the area. The study may help to strengthen the prevailing information and communication network which will provide solution to the problem of lack of awareness and information about available livelihood options in rural youth of hills. The line departments, research centers, universities and knowledge hubs may utilize the propositions emerging through this research to spread and disseminate the technology related to different vocations among rural youth of Uttarakhand with the ultimate aim to reverse out-migration and sustainable livelihood for the rural youth.

Paper received on : April 15, 2020
Accepted on : April 22, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (76-82)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Supply Chain of Potato in East Khasi Hills District of Meghalaya: A temporal Analysis

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ABSTRACT

Potato crop in the state has its own recognition and it is reaching to every ranch of the state. Keeping in view the present study was conducted in East Khasi hills district of the Meghalaya state. The findings demonstrates the growth trends of potato crop, producers' surplus, disposal pattern, price spread which are immense for developing the policy on production and post harvest management of the crop. As the channel-I was preferred and maximum produce was disposed; the channel-I need to be strengthened through technological intervention like value addition in the crop. Further, the price spread analysis is an insight for improvement in the market for unscrupulous practices adopted by different intermediaries in the potato market.

Keywords: Channel, Potato, Supply, Value addition

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the prominent food crop in the world after rice and wheat in terms of human consumption (Gastelo *et al*., 2014). Direct consumption of potato as human food is 31.3 kg per capita per year (FAOSTAT, 2014). Potato is supplementing meat and milk products by decreasing energy intake and also by decreasing food cost. Potato plays multiple and prominent roles in neighbourhood food systems and for food security (FAO, 2008). By providing income generation opportunities as a cash crop and generating employment, potato contributes to alleviating poverty (Scott and Ringler, 2000). Further, it speak to a significant source of vitality, with a high conveyance of vitality per unit land, water and time, and are a prominent wellspring of mineral deposits and nutrients for the eating regimen (Anderson *et al*., 2010). The potato is a "cool climate crop", with the temperature being the primary constraining variable. The climate of the state of Meghalaya is highly congenial for cultivation of potato throughout the year. Potato occupies a key position in the cropping patterns in Meghalaya and significantly shares to rural agrarian economy. There are two potato crop seasons (Summer crop and Winter crop). "The average productivity of potato in the Meghalaya state produced 9.2 tons per hectare, almost half that of the national average" (CPRI, 2006). Factors like rainfed cultivation, non-availability of quality seed, high disease incidence, *etc.* contribute to low potato yields. The state has however high per capita potato utilization (93 kg) which is higher than even the national level potato consumption (17 kg).

In spite of having favorable climatic conditions including technological back-up for potato in the state; the state could not come-up in significant contribution of potato production in the country. There may be some hidden constraints with potato growers like mostly were illiterate with marginal and small landholding without any

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of technologies, unorganized and scattered landholding and difficulty in marketing of potato in hilly terrains especially in remotely located villages. Hence, to enhance research and development expenditures in North Eastern Hill Region was especially to develop small size of machinery with the intent to reduce cost of human labour needed (Singh *et al.*, 2019). Other problems like; non-availability of finance, which led to distress sale of surpluses just after harvest at a low price (Singh *et al.*, 2020). Although, some extent contract farming model of main lands in India has protected the potato grower from its price uncertainty (Tripathi *et al.*, 2005). Marketing through Self-Help Group (SHG) may prove fruitful as a distribution strategy as women in the groups are having a high percentage of population and are willing to undertake entrepreneurial activities (Kumari *et al.*, 2019). Hence, temporal analysis of supply chain of potato in Meghalaya is immense.

METHODOLOGY

The present study was conducted in East Khasi Hills (EKH) district of Meghalaya as it contributes about 63.63 per cent of the total area and 68.90 per cent of the total production of potato in the state. Also the compound annual growth rate of area and production in this district has been observed to be increasing in proportionate way. Three markets namely regulated market (Mawiong), weekly market (Smit market) and daily market (Bara Bazar, Shillong) were selected as marketed surplus has been observed more of potato in these market of EKH district. A sample of 36 number of respondents, including trader, wholesaler, retailer and potato growers were interviewed for collecting primary data. Smit village was selected purposively because it was one of the highest potato producing villages in EKH district in both the seasons from where a sample of 10 potato grower was drawn. The primary data were collected for both the seasons from the same respondents of potato growers as well as the marketing agencies. The respondents were interviewed twice for *summer* and *winter* season as potato is grown in two seasons. Data were collected using pre-tested well structured schedule through personal interview of the respondents for the crop year 2019-20. The data collected from the respondents includes production, consumption and disposal of potato. Secondary data on production, area and productivity of potato has been collected for the period of 2005-06 to 2017-18.

Temporal analysis was applied to analyze the secondary data. Linear trend lines for area and production of potato were estimated. Compound annual growth rate (CAGR) was calculated by using log-linear model.

$$\text{Log } Y_x = \beta_1 + \beta_{2x} + u_x$$

Where, Y= dependent variable, x = time, $\beta 1$ = intercept, $\beta 2$ = slope coefficient, CAGR = (Exp ($\beta 2$)-1) X 100

Marketable surplus

$$M_s = P - C$$

Where, M_s = Marketable surplus, P =Total production, C=Total requirement (family consumption, farm needs, payment to labor, artisans, Land lord and payment for social and religious work)

Marketed surplus

$$M_t = M_s - (L_m - L_t)$$

Where, M_t = marketed surplus, M_s = marketable surplus, L_m = losses during transportation and marketing, L_t = arbitrary deduction or under weighing by traders at the market

The total cost incurred on marketing either in cash or in kind by the producer seller and by the various intermediaries involved in the sale and purchase of potato till the commodities reaches the ultimate consumer, was computed as:

$$C = C_F + C_{m1} + C_{m2} + C_{m3} + \ldots + C_{mi}$$

$$C = C_F + \Sigma C_{mi}$$

Where, C = Total cost of marketing of the potato, C_F = Cost paid by the producer at the time the produce leaves the farm till he sells it, C_{mi} = Cost incurred by the i^{th} middleman in the process of buying and selling potato.

Marketing margin of middlemen was the difference between the total payments (cost + purchase price) and

receipts (sale price) of the middlemen (i^{th} agency). It was expressed as:

$$A_{mi} = P_{ri} - (P_{pi} + C_{mi})$$

Where, A_{mi} = absolute marketing margin of i^{th} middlemen, P_{ri} = total value of receipts per unit (sale price), P_{pi} = purchased value per unit (purchased price), C_{mi} = cost incurred on marketing per unit

Percentage margin of middleman was worked out the percentage share of margin of middleman following formula has been used:

$$(P_{mi}) = P_{Ri-}(P_{pi} + C_{mi}) / P_{pi} x\ 100$$

Where, P_{Ri} = Total value of receipts per unit of produce (sale price), P_{pi} = Purchase value of goods per unit of produce (purchase price), C_{mi} = Cost incurred in marketing per unit.

Thus it includes the profit of the middleman and the returns.

Producer's Share in Consumer's price was calculated in terms of percentage of the retail price (*i.e.*, the price paid by the consumer) is the producer's share.

$$P_s = Pf / Pr\ X\ 100$$

Where, P_s = Producer's share in the consumer rupee, P_f = Price received by the farmer per unit of output, P_r = Retail price per unit of output

Price spread was referred as the difference between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce. It was calculated by using the following formula.

$$P_s = (P_s - P_f) / P_s\ X\ 100$$

Where, P_s = Producer's share in the consumer rupee, C_F = Price received by the farmer per unit of outputs, P_A = Retail price per unit of output, and

$$P_f = P_{A-} C_F$$

Where, P_f = Net price receive by producer, P_A = Wholesale price, C_F = Marketing cost incurred by producer

Hence,

$$\text{Price spread} = P_c - P_f$$

Where, P_c = price paid by consumer and P_f = price received by the producer

Marketing Efficiency was defined as the effectiveness or competence with which a market structure performs its designated function. This will be computed using the Acharya's modified marketing efficiency (MME) approach (Acharya and Agarwal, 2011) given as:

$$MME = FP \div (MC + MM)$$

Where, MME = modified measure of marketing efficiency, FP = price received by farmers, MC = marketing cost, MM = marketing margins.

RESULTS AND DISCUSSION

The analysis of growth trends were categorized into two periods *viz;* 2005-06 to 2012-13 and 2013-14 to 2017-18 as state of Meghalaya comprised 7 districts till 2012-13 and later on 4 more new districts were carved in the state to make the 11 district having state of Meghalaya.

The growth rate of area under potato was negative though not significant in the state in districts (Table 1). In the period of 2005-06 to 2012-13 South Garo hills recorded 4.60 per cent of growth in area. In Ri-bhoi district (0.32%) and East Khasi hills district (0.062%) showed positive growth but insignificantly. West Khasi hills (-0.58%) and East Garo hills (-4.88%) districts showed negative growth in the study period but non-significant. Table further reveals that annual growth rate of area was positive for all districts significantly at slow rate. The highest growth was of 10.16 per cent recorded in East Jaintia hills followed by Ri-bhoi district (8.09%). All districts showed significant positive growth in study period except East Garo hills district (1.25%) and North Garohills district (1.56%) where it was non-significant. Over all in Meghalaya area under potato increased significantly at a rate of 0.72 per annum during period of 2013-14 to 2017-18.

The growth of potato in terms of production was increasing across all the districts except Jaintia hills (-

Table 1: Growth rate of Area of potato in Meghalaya (2005-06 to 2012-13 and 2013-14 to 2017-18)

Particulars	Trend value	P-value	Equation	CAGR (%)
2005-06 to 2012-13				
Ri-Bhoi	0.0032	0.78^{NS}	3.29+0.003x	0.32
East Khasi hills	0.0006	0.7^{NS}	9.33+0.0006x	0.062
West Khasi hills	-0.006	0.13^{NS}	8.65-0.005x	-0.58
Jaintia hills	-0.05	0.05	5.61-0.05x	-4.88
East Garo hills	-0.0002	0.97^{NS}	4.89-0.0002x	-0.024
West Garo hills	0.032	0.05	6.08+0.032x	3.28
South Garo hills	0.045	0.01	3.81+0.04x	4.60
Meghalaya	-0.001	0.58^{NS}	9.79-0.001x	-0.106
2013-14 to 2017-18				
Ri-Bhoi	0.078	0.05	3.27+0.078x	8.09
East Khasi hills	0.005	0.05	9.36+0.005x	0.55
West Khasi hills	0.007	0.05	8.20+0.007x	0.70
South West Khasi hills	0.009	0.05	7.58+0.009x	0.93
East Jaintia hills	0.09	0.01	3.56+0.09x	10.16
West Jaintia hills	0.03	0.05	5.12+0.031x	3.15
East Garo hills	0.012	0.18^{NS}	4.34+0.012x	1.25
North Garo hills	0.015	0.22^{NS}	4.01+0.015x	1.56
West Garo hills	0.021	0.05	5.8+0.021x	2.09
South West Garo hills	0.005	0.01	5.41+0.005x	0.53
South Garo hills	0.03	0.05	4.13+0.027x	2.7
Meghalaya	0.007	0.05	9.81+0.007x	0.72

Note: NS-non significant

13.06%) and West Khasi hills districts (-2.10). Highest compound annual growth of production has been observed a rate of 3.76 per cent and 3.51 per cent in East Garo hills district and South Garo hills district, respectively. The production of potato in Ri-bhoi district and East Khasi hills district had risen non-significantly at the rate of 1.05 per cent and 0.42 per cent, respectively (Table 2).

The marketable surplus of potato in summer season and winter season was observed to be of 4465 kg and 3265 kg, respectively. Potato retained for different purposes like family consumption and seed material in which highest share was observed of seed material 16.93 per cent followed by family consumption (8.21%). Similarly, in winter season seed material recorded as highest share (15.33%) followed by family consumption (15.33%).

For the disposal of potato from the grower to the ultimate consumer three major marketing channels were identified as given below.

(i) Channel-I: Producer → Traders → Wholesaler → Retailer → Consumer

(ii) Channel-II: Producer → Wholesaler → Retailer → Consumer

(iii) Channel-III: Producer → Consumer

The highest quantity of the whole potato in summer season was observed to be disposed through traders which was highest followed by wholesalers, retailers and small portion straightly sold to the consumer (Table 4). Under channel-I (Producer → Traders → Wholesaler → Retailer → Consumer), the trader purchased 62.13

Table 2: Growth rate of production of potato in Meghalaya (2005-06 to 2012-13 and 2013-14 to 2017-18)

Particulars	Trend value	P-value	Equation	CAGR (%)
2005-06 to 2012-13				
Ri-Bhoi	0.01	0.25^{NS}	5.02+0.01x	1.05
East Khasi hills	0.042	0.26^{NS}	11.58+0.004x	0.42
West Khasi hills	-0.021	0.34^{NS}	10.92-0.0212x	-2.10
Jaintia hills	-0.14	0.05	7.79-0.14x	-13.06
East Garo hills	0.01	0.1	6.87+0.01x	1.05
West Garo hills	0.04	0.01	8.11+0.04x	3.76
South Garo hills	0.034	0.01	5.86+0.034x	3.51
Meghalaya	-0.004	0.5^{NS}	12.05-0.004x	-0.43
2013-14 to 2017-18				
Ri-Bhoi	0.085	0.05	5.07+0.085x	8.88
East Khasi hills	0.007	0.05	11.7+0.007x	0.73
West Khasi hills	0.008	0.01	10.19+0.008x	0.81
South West Khasi hills	0.009	0.05	10.13+0.91x	0.91
East Jaintia hills	0.10	0.10	5.29+0.10x	10.81
West Jaintia hills	0.032	0.05	6.72+0.03x	3.22
East Garo hills	0.008	0.38^{NS}	6.44+0.008x	0.77
North Garo hills	0.012	0.29^{NS}	6.12+0.012x	1.21
West Garo hills	0.157	0.16^{NS}	7.28+0.16x	16.9
South West Garo hills	0.009	0.05	7.62+0.009x	0.9
South Garo hills	0.022	0.05	6.13+0.02x	2.23
Meghalaya	0.008	0.05	12.1+0.008x	0.82

Note: NS-Non-significant

Table 3: Producer's surplus and utilization pattern of potato (kg)

Particulars	Summer potato	Winter potato	Overall
Total production	5965	3980	9945
a) Family consumption	490(8.21)	105(2.63)	595(5.98)
b) Seed material	1010(16.93)	610(15.33)	1620(16.29)
Total (a and b)	1500(25.14)	715(17.96)	2215(22.27)
Marketable surplus	4465(74.85)	3265(82.03)	7730(77.72)

Note: Figures in the parentheses are percentage to total production

percent of total volume of potato production directly from the potato producer and disposed-off to retail market. Under channel-II (producer → wholesaler → retailer → consumer), the retailer procured 45.2 per cent of potato production directly from the grower. The study also revealed that under channel-III (producer → consumer), the producer had sold 8.16 per cent of the total volume of their production directly to the consumer.

The study shown that net price received by potato producer was highest in channel-III (Rs 1794.17/q) which shared of 94.43 per cent of the consumer's rupee (Table 5). It was followed by channel-II and channel-I. It was evident that channel-III was most efficient due to less number of intermediaries followed by channel-II and channel-I. Further, higher marketing cost in channel-I (37.64%) was due to more intermediaries in the channel.

Table 4: Disposal pattern of potato through different channels (kg)

Marketing channel	Summer potato	Winter potato	Overall
Channel-I	3081.30 (69.01)	1803.91 (55.25)	4885.21 (62.13)
Channel-II	1158.22 (25.94)	1257.68 (38.52)	2415.9 (45.2)
Channel-III	225.48 (5.05)	203.41 (6.23)	428.89 (8.16)
Total	**4465 (100.00)**	**3265(100.00)**	**7730(100.00)**

Note: Figures in the parentheses are percentage to the total production

Table 5: Price spread of potato

	Channel -I	Channel II	Channel III
Summer			
Marketing cost	268.79 (12.89)	228.41 (11.42)	105.83 (5.57)
Marketing margin	516.21 (24.75)	455.81 (22.79)	-
Price spread	785 (37.64)	684.22 (34.21)	105.83 (5.57)
Net price received by producer	1300 (62.35)	1316.78 (65.84)	1794.17 (94.43)
Consumer price	2085	2000	1900
Winter			
Marketing cost	272.52 (10.09)	236.07 (9.15)	107.89 (4.50)
Marketing margin	677.48 (25.09)	523.45 (20.2)	-
Price spread	950 (35.18)	759.52 (29.44)	107.89 (4.50)
Net price received by producer	1750 (64.81)	1814.40 (70.32)	2292.11 (95.50)
Consumer price	2700	2580	2300

Note: Figures in the parentheses are percentage of the consumer's price

The consumer's price was quoted highest in channel-I (Rs 2085/q), followed by channel-II (Rs 2000/q) and channel-III (Rs 1900/q). The study exposed that net price received by potato grower was recorded to be highest in channel-III (Rs 2292.11/q). It was evident from the study that channel-III was most efficient in which marketing cost. Consequently, potato producer received higher share in consumer's price under channel-III (95.50%). It may be due to non-existence of marketing functionaries in the channel. The consumer's price was recorded highest in channel-I (Rs 2700/q), followed by channel-II (Rs 2580/q) and channel-III (Rs 2300/q).

CONCLUSION

The growth rates of area and production of potato were in increasing trend in recent period but it was found declining in earlier period *i.e.* 2005-06 to 2012-13. The marketable surplus also found in safer side and signifies healthy and sound economic status of the potato growers in the state. The channel-I was found to be preferred channel through which highest produce was disposed to the market. Hence, the channel-I must be taken care to enhance its efficiency through market intervention for increasing the due share of the potato growers in consumer' price. Further, looking the marketable surplus of the potato in the state some interventions related to value addition must be tapped in the state.

Paper received on : April 07, 2020
Accepted on : April 22, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (83-88)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Employers' Placement Expectations in Agricultural Graduates of Tamil Nadu Agricultural University

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ABSTRACT

The study was designed to identify the factors fixed to be the parameter by the job providers during placements of agricultural graduates. Twelve parameters were identified for understanding the preference during recruitment of agricultural undergraduates and they were found to fall under dimensions like education, personality and socio economic traits. 34 active job providers in the field of agriculture were identified. A structured mailed questionnaire was prepared and used for the data collection. Results showed that the preferential behavior of job providers was highly diversified based on the nature of job and the job requirement. It was found that the degree of expectation as a whole was found to be low to medium to support underprivileged and struggling students. The job providers were not very rigid or over demanding in selecting an eligible candidate. The preference was given mostly to knowledge, skill and personality rather to socio, economic status.

Keywords: Agricultural undergraduates, Employer preference, Employer's expectations, Job provider's requirement, TNAU

INTRODUCTION

Irrespective of the technological growth in this modern era, agriculture is one sector that still requires man power while it is replaced with machines and technologies in many other sectors. Agriculture is a potential occupation that has the capacity to absorb immense number of graduates. Meanwhile graduate employment has been a global concern for all higher education sectors (Mirakzadeh and Ghiasy, 2011). The student's enrollment in agricultural universities is found to be in increasing trends in the recent years. The statistical ratio of student's enrollment in agricultural universities versus other higher education is found to be across several developing countries like Iran, Ghana etc. However, there is a notable prevalence of unemployment among the agricultural graduates. The reasons for the unemployment status has been reported to be insufficient recruitment in public sectors, unfavorable work environment in public sector and lack of harmony between university education and agricultural profession (Mirakzadeh and Ghiasy, 2011). The balance between employment and unemployment status must be kept minimal to maintain harmony and peace in the society (Qu, 2009; Ahmadpour, 2007). Employment status is often fixed to be a parameter of success of a person depicting their knowledge, skill, attitude, achievements and talent (Yorke and Knight, 2003). Agriculture being a largest occupation lends more job opportunities through secondary and tertiary sectors like processing or industrial sectors and sectors than through the primary sector. The rapid rise in population and the increasing students' enrollment into the higher educational institutes ultimately supplies a large number of agricultural graduates in the labour market, while the

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number of firms to absorb the graduates is increasing in a comparatively declining rate. Thus a vacuum has been created due to a strong internal competition. Most importantly the employer's expectations are highly diverse and situation oriented as the recruitment is influenced by several factors. Many organizations considers reputation of the educational institution (Anyanwu, 2000; Ahmadpour, 2007), proficiency in foreign language (Anonymous, 2007), computer literacy and IT skills (Mirzaei *et al.*, 2007), etc. Students' demographic and socio-economic status of life also plays an important role in recruitment process (Hemmati *et al.*, 2007). According to Mirakzadeh and Ghiasy (2011), it is found that the candidates with previous knowledge, skill and experience in the field of agriculture, better communication skills and moderate level of socio-economic status are more preferred by the job providers. The reason for taking up a study in the process of selection and recruitment are mismatch between the employer's needs and the qualification of the candidate, lack of exposure about the labour market, lack of career guidance, etc. (Anonymous, 2007). Thus attempt was made to explore the major parameters considered by the employers during placement of an agriculture graduate and to understand the employer's expectations, demands and needs on the candidates to be selected for their firm.

METHODOLOGY

In accordance with the objectives of the study, the main campus of Tamil Nadu Agricultural University, Coimbatore was purposively selected. The present study is aimed to come out with better strategies to improve the employment opportunities of the selected agricultural education system. The most related stakeholders here are the job providers. The university is regularly arranging job fairs every year and hence, a good percentage of the students are getting their placements even before completing their degree programme. Considering this fact a complete list of active job providers was obtained from the placement cell functioning under the Directorate of Students Welfare of this university. Further, other promising job providers were also identified through elaborate discussion with the senior scientists, experts, friends and through leading newspapers and employment magazines. Thus, finally a list of 122 active job providers was identified. A semi- structured questionnaire seeking the required information, was sent to all identified job providers through e-mail. Only 34 job providers furnished the information after repeated reminders, which have been considered for analysis. Exploratory research design was employed for this study. Every job provider respondents were asked to record their preference against twelve dimensions like gender, campus studied, OGPA, language knowledge, rural-urban background of the expected employee, socio-economic status, work experience, material possession, physical appearance, relocating preference, communication & interpersonal relationship and their activity in extra- curricular activity. These items were identified and developed based on the previous studies and discussion with promising job providers, senior scientists, educationalists, placement officers, university administrators and extensionists. Item wise percentage analysis was done for the meaningful interpretation of the results.

RESULTS AND DISCUSSION

The recorded preferences of the selected job providers against ten dimensions like gender, campus studied, OGPA, language proficiency, rural-urban background of the employee, socio-economic status, work experience, material possession, physical appearance and their involvement in extra-curricular activities are given in Table 1, which depicts that half of the respondents (50.00%) had no specific preference towards the campus in which the students have completed their courses. Almost an equal proportion of the respondents (47.06%) have reported in favor of students educated at government or constituent campuses. Only a trifling percentage of respondents (02.94%) expressed their willingness to recruit the students completed at private or affiliated campuses of TNAU.

About two fourth of the respondents (47.10%) pointed out that they always give prime importance for the Overall Grade Point Average (OGPA) secured by the graduates, followed by about two fifth (38.20%) gave occasional importance. Little more than ten percent of the respondents (14.70%) stated that they normally don't give importance for the OGPA. With regard to the rural-urban background of the agricultural graduates, majority

Table 1: Employers Placement Expectations on Agricultural Graduates of Tamil Nadu Agricultural University (n = 34)

S.No.	Preference dimensions	Categories	Number	Percentage
1.	Preference towards campus	No preference	17	50.00
		Govt./ constituent campus	16	47.06
		Private/ affiliated campus	01	02.94
		Total	**34**	**100**
2.	Weightage given to academic OGPA	Always	16	47.10
		Sometimes	13	38.20
		Never	05	14.70
		Total	**34**	**100**
3.	Preference given to rural- urban background	No preference	19	55.88
		Rural	15	44.12
		Urban	00	00.00
		Total	**34**	**100**
4.	Preference given to gender	No preference	19	55.88
		Male	14	41.18
		Female	01	02.94
		Total	**34**	**100**
5.	Preference given to work experience	Fresher	15	44.12
		1 yr	03	08.81
		2 yrs	09	26.47
		3 yrs	05	14.70
		>3 yrs	02	05.90
		Total	**34**	**100**
6.	Preference based on material possession	No preference	22	64.71
		Motor cycle	07	20.58
		Both motor cycle and laptop	05	14.71
		Total	**34**	**100**
7.	Level of importance given for physical appearance	Lesser importance	08	23.53
		Medium importance	20	58.82
		Higher importance	06	17.65
		Total	**34**	**100**
8.	Degree of importance given for socio-economic status	No preference	20	58.82
		Low	09	26.47
		Medium	04	11.77
		High	01	02.94
		Total	**34**	**100**
9.	Preference given for language	English	03	08.82
		Local language	01	02.94
		Both	30	88.24
		Total	**34**	**100**

Table 1 contd...

S.No.	Preference dimensions	Categories	Number	Percentage
10.	Degree of importance given for extracurricular activities	Always	06	17.65
		Sometimes	22	64.70
		Never	06	17.65
		Total	**34**	**100**
11.	Relocating preference	No preference	01	02.94
		Native to job location	03	08.82
		Non- native candidate willing to relocate	30	88.24
		Total	**34**	**100**
12.	Preference based on communication and interpersonal skills	Yes	26	76.47
		No	08	23.53
		Total	**34**	**100**

of the respondents (55.88%) stated that they normally don't give preferences to their rural-urban background. Slightly greater than two fifth of the respondents (44.12%) preferred graduates with rural background. Specific preference towards urban based graduates was not reported. About 56 per cent of the respondents stressed that they don't have any gender bias in recruitment. About forty percentage of the respondents (41.18%) preferred male graduates for their organizations, whereas, only 02.94 per cent of the respondents preferred women candidates over men for their organization.

Less than fifty percent of the respondents expressed that they have no bias between fresher and experienced person. Slightly greater than one fourth of the respondents (26.47%) emphasized their preference towards 2 years of work experience for recruitment, followed by three years (14.70%), one year (08.81%) and more than three years (05.90%) of working experience. Majority of the respondents (64.71%) pointed out that they don't have any preference with respect to the material possession of the graduates. About one fifth of the respondents (20.58%) preferred the applicants with minimum of a motor cycle. About fifteen percentage of the respondents (14.71%) reported that they want their employees to be possessed with a motor cycle and a laptop. Almost sixty percentage of the respondents were found to give moderate importance for the physical appearance of the candidates. Little less than one fourth of the respondents (23.53%) stated that they were not concerned about the physical appearance, followed by 17.65 per cent with more concern towards physical appearance. Their preference towards physical appearance included; neat dressing habit, well groomed, enthusiastic and very active personality. Similarly, 58.82 per cent of the respondents did not have any preferences towards the socio- economic status of the candidates, whereas, 26.47 per cent of the respondents preferred graduates from lower socio-economic status, followed by medium (11.77%) and higher levels (02.94%) of socio-economic status.

Language proficiency with respect to both 'English' and local language was preferred by most of the respondents (88.24%). Only 8.82 per cent of the respondents stated that proficiency with 'English' alone is enough. Only a meager percentage (02.94%) preferred candidates with proficiency in local language alone. Majority of the respondents (64.70%) reported that they give importance for the extra-curricular performance occasionally. Only 17.65 per cent expressed that they ever considered extra-curricular performances. The same percentage of the respondents reported that they never considered this. Majority of the respondents (88.24% preferred candidate willing to relocate themselves and with good communication and interpersonal skills (76.47%).

Based on the above findings it can be interpreted that majority of the job providers did not have any special preference towards the social attributes, except for academic performance. Government / constituent

campuses were preferred over affiliated / private campuses may be due to merit based admission process adopted by TNAU. Moreover, well-established laboratories and experience rich teachers were available in TNAU. Organizations recruiting graduates for research and extension require strong academic background. Whereas organizations like NGOs, finance or production and processing industries gave more importance to soft skills and interpersonal skills than academic merits. Extension and rural development activities, finance approval and marketing segments require maximum level of field work, hence, those job providers expressed their preferences towards male candidates and possession of a motor cycle. Because of digitalization and advancement with ICT considerable proportion of the respondents emphasized the candidates to have laptops. Job providers preferred to have experienced candidates to reduce their cost of investment and time involved in manpower training. They also had a perception that the rural background and the lower socio-economic status could possibly be oriented towards income and economic gains and hence, they may not quit their jobs so early and they preferred to recruit these candidates. As majority of the roles and responsibilities played by the agricultural graduates relate to bridge the gap between localites and the resources, it was highly preferred to possess proficiency in both official language (English) and local language (Tamil). As the extra- curricular activities have the potential to build creativity, soft skills and inter-personal skills, certain level of importance was also allotted. It could also be observed that majority of the respondents preferred graduates with science degree offered at TNAU particularly B.Sc. (Ag.). A small percentage of the respondents (11.80%) preferred students trained in either science or technical courses offered by TNAU. The results were found to be contradictory with the views expressed by Petersen *et al.* (2008) as the majority of organizational authority did not express a demographic preference as per their review. The findings disproves the results quoted by Kuhn *et al.* (2009) where results were based on the review of ads from a Chinese internet job board as a vast majority of the advertisements seek work expertise of one to three years, one in ten ads expressed gender preference and one in three ads emphasize physical attractiveness. The study also derives support from the results of Ouraich *et al.* (2017), who explained that being male and higher academic performance leverage the probability of employment. He also reported about the desire of the job providers to hire university graduates over non- university campus students. As such the job providers were not very rigid or over demanding in selecting an eligible candidate. The preference was given mostly to knowledge, skill and personality rather to socio, economic status.

CONCLUSION

The job providers felt that the candidates would be inducted to training and would be molded as per the requirement of the job. Thus majority of the job providers gave medium level of importance to the campus of education or the overall grade points secured by the graduates. Majority of the job providers feels that demographic and socio-economic characteristics of the graduates as less important in spite of their attitude and psychological traits. The students of this modern and digital era expect jobs to be more sophisticated and requires less physical labour, being an agricultural graduate and an entry level employee the employers expect them to perform more field oriented tasks but the societal exposure of the graduates teaches them to expect more techie work than field related works. The gender bias was not a problem with the employers, however the female agricultural graduates themselves hesitate to join jobs with private companies, banks or MNCs, as they are expected to travel a lot for either marketing or sales or farm visit purposes. The majority of the female graduates selected through campus or placement drives even decline to join because of peer and family decisions. This ultimately pushes the job providers to be more picky and biased in employee selection. Opting for field oriented, skill based, service oriented and labour intensive type education, the graduates should be prepared to face the society and field. Proper counseling, guidance and motivations should be given to the graduates during their educational phase at the college to meet out the demand of qualified agricultural graduates in the job market.

Paper received on : April 11, 2020
Accepted on : April 19, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (89-92)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Research Note

Attitudes of Students on School Vegetable Garden and Gardening Activities in Kerala

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ABSTRACT

A school vegetable garden is an innovative teaching tool and strategy that lets students incorporate hands-on activities in a diversity of multidisciplinary, standards-based lessons. The vegetable garden engages students by providing an energetic environment for them to observe, discover, experiment, nurture, and learn. The study was conducted in Thiruvananthapuram district of Kerala to identify the attitudes of students on school vegetable garden and gardening activity programme. Around 100 schools in Thiruvananthapuram are undertaking vegetable gardening in the district. Ten schools were selected for data enumeration. A total of students comprising ten students each were selected for meeting the objectives of the study. The student's attitude was positive (60%) as a result of the influence of getting involved in school garden activities considering the mean attitude value (38.58) as a check. Age, training need, education and dwelling place were negatively correlated with attitude.

Keywords: Attitudes of students, School vegetable garden, Real-life experiences

INTRODUCTION

Harnessing the infrastructural and human resources for agricultural development of this productive arena may open up a new gate for agricultural development in in terms of satisfying the internal requirement of vegetables and other horticultural produces through school gardens and regarded as 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. Through the garden, students gain an understanding of ecosystems, an appreciation for food origins and nutrition, and knowledge of plant. At the same time, they learn practical horticultural skills that last a lifetime. The school vegetable garden movement originated in Europe and arrived in the United States in the 1890s. Vegetable gardens skipped up at schools all over the country during the early 20th century, more recently, the popularity of school gardens as an educational tool has steadily grown as a way to teach healthy eating behaviors and a way to incorporate and increase hands-on learning experiences in interdisciplinary lessons. (The Hindu, 2006).

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. Kerala Agricultural University also supports agricultural school outreach programmes through its extension system and student social bodies like National Service Scheme with an aim to improve the knowledge, skill, attitude and understanding of the school children on agriculture with special reference to vegetable gardens. The focus of

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school gardens has shifted in purpose from production, loyalty, and safety to health and nutrition. Health and school officials see the school classroom and the lunch room as associations for garden nutrition programs. Hands-on nutrition programs based on the use of gardens increased the number of fruits and vegetables children eat on a daily basis, particularly as healthy snack choices. With this background the present study was conducted to study the attitudes of students on school vegetable garden.

METHODOLOGY

A direct survey approach was followed for recording the primary data from the respondent at the field level, based on the ex-post facto research design. Thiruvananthapuram district widely known as the educational capital is purposively selected for the study. Many Government, Aided and Unaided schools are maintaining vegetable gardens through the funding of State Government and the service support extended by 'Department of Agriculture Development and Farmers' Welfare', Kerala. It was understood after discussion with Directorate of Public Instruction (DPI), around 100 schools in Thiruvananthapuram were undertaking vegetable gardening in the district. The study was conducted in Thiruvananthapuram district involved 100 respondents with 10 students each from 10 schools during the period, 2016-2017. The scale developed by EARTH programme with slight modification was used for quantification of attitude of students. Scale consisted of 14 statements of which 9th, 10th, 11th, 12th, 13th and 14th were negative. The respondents were asked to state their response on a four-point continuum ranging from 'strongly agree', 'agree', 'disagree' and 'strongly disagree'. The score for attitudes towards gardening and garden activities available in the school was obtained from the school students. The score that a student could obtain was 4 and 1 as maximum and minimum respectively. The score obtained for the fourteen statements were cumulated to obtain the attitude score of the respondent. The score that could be obtained by a respondent was 56 and 14 as maximum and minimum respectively. Based on the score respondents were grouped into different categories viz., high, medium and low.

RESULTS AND DISCUSSION

The distribution of students based on their attitude as perceived by students is represented in Table 1, which shows that majority of student's (60%) attitude was positive as a result of the influence of getting involved in school garden activities followed by (40.0%) as not positive , the mean attitude value (38.58). However, the higher mean value of students attitude towards school gardening activities is an indication of the interest among students and this could be the reason that majority of the students attitude was influenced as a results of them engaging in school gardening activities. The result was in confirmation with the findings of Derman (2007) and McBeth and Volk (2010).

Table 1: Distribution of students based on Attitude

Category	Students (N=100)	
	Frequency	Percentage
Positive (Above mean)	60	60.00
Not positive (Below mean)	40	40.00
Mean	38.58	
Standard deviation	3.294	
Standard error	0.3294	

The statements of attitude for students towards school vegetable gardening is represented in Table 2 with their respective scores obtained by 100 students.

The influence of the independent variables on the attitude was found out using simple correlation analysis and the results are presented in Table 3 highlight that out of 13 independent variables only age was negatively and significantly (at 1%) correlated with attitude of students engaged in school vegetable gardening. Three variables viz., training need, education and dwelling place were negatively and significantly (at 5%) correlated with student's attitude. However, variables like distance, political orientation, social participation, garden experience, level of encouragement, personal and social factors, economic factors, technological factors, awareness, knowledge, mass media exposure and benefits had no significant relationship with the attitude. Negative and significant correlate value for age with students' attitude could be a reasonable finding as it is general that students' inclination to extra-curricular

Table 2: Statements wise attitude of students towards school vegetable gardening

S.No.	Attitude statements	Score
1	Involving myself in school vegetable gardening activities helps to improve my self-esteem and attitudes toward school vegetable garden.	383
2	Engaging myself in school vegetable gardening activities helps to improve my social skills and behaviour	364
3	Participating in school vegetable gardening activities helps to improve my environmental stance	366
4	Through school gardening activities group cohesion increases and there by helps to improve my interpersonal relationships	351
5	My science achievement scores have increased significantly after getting to be a part of school garden activities	359
6	School garden activities helped to increase my sense of ownership and responsibility and interpersonal relations with school children	353
7	School garden activities foster family relationships and increase student-teacher-parent involvement	355
8	I believe that school gardening activities should be included as a part of curriculum and all students should be made to compulsorily participate	367
9	I lose my interest in growing vegetable garden if not successful.	181
10	Increased spending on agricultural activities in schools, I believe is a waste of money and time	167
11	It is difficult for me to learn and internalize growing of vegetables and plants in garden activities	169
12	I am afraid that I will score less marks in getting myself involved in school garden activities	162
13	I don't like to garden because it is hard work	146
14	I don't like to garden because I get dirty	135

activities like gardening may decrease as age increases. This is because students will be more focused in their studies keeping an eye on academic excellence in board examination. Also, pressure from parents and school policies may also restrict students from such activities as they reach higher grades.

Community service and service learning in school have become an important event along with formal education. This is as a result of political orientation and generally it is expected that the state citizen (Kerala) are highly politically sensitive and finds it as a venue to express their social orientation as well. The study approves the findings of several researchers like McAleese and Rankin (2007) and Ratcliffe *et al*. (2011). Students may have the tendency to abstain from school gardening activities for the reason that parents and teachers give more thrust for academic importance. Hence, purpose of involvement could be less and the findings that it is negatively and significantly correlating with attitude assume importance. Since teachers are the main actors of the programme, the students might not recognize training need as important and hence the finding that training need is negatively and significantly correlating with attitude of

Table 3: Correlation between attitude and other profile characters of students on school vegetable gardening

S.No.	Independent variables	Students (N = 100)
1	Age	-0.321**
2	Education	-0.225*
3	Dwelling place	-0.003
4	Distance	0.184
5	Political orientation	0.084
6	Social participation	0.135
7	Gardening experience	0.178
8	Factor of influence	
8.a	Level of encouragement	-0.013
8.b	Purpose of involvement	-0.208*
8.c	Personal & Social factors	-0.087
8.d	Economic factors	-0.067
8.e	Technological factors	-0.191
9	Awareness	0.069
10	Knowledge	0.004
11	Mass media exposure	0.042
12	Training need	-0.392*
13	Benefits	0.182

(** 1% Significant level; *5% significant level)

Table 4: Kruskal Wallis test for students in each school based on attitude

Schools	Total score	Mean score	Rank
Government High School, Vazhamuttom, Thiruvananthapuram	525	52.50	4th
M G M Vidya Mount Public School, Edavilakom, Thiruvananthapuram	361.5	36.15	8th
Government Girls High Secondary School, Cotton Hill, Vazhuthacaud, Thiruvananthapuram	836	83.60	1st
Government Girls Higher Secondary School, Attingal, Thiruvananthapuram	221.5	22.15	10th
St. Mary's Higher Secondary School, Pattom, Thiruvananthapuram	653.5	65.35	3rd
Sree Sethu Parvathi Bhai High School, Kadakkavoor, Thiruvananthapuram	457.5	45.75	7th
B N V V Higher Secondary School for Boys, Thiruvallam, Thiruvananthapuram	350.5	35.05	9th
Government High School, Pappanamcode, Thiruvananthapuram	679	67.90	2nd
S N V Government Higher Secondary School, Kadakkavoor, Thiruvananthapuram	471.5	47.15	6th
St. Joseph's Higher Secondary School, Palayam, Thiruvananthapuram	494	49.40	5th
Kw Calculated value		34.5	
Table value		16.92 (5%) 21.67 (1%)	

students holds correct. The results are in conformity to the findings of Seshan (2014) who reported heightened awareness, body-kinesthetic abilities, interpersonal skills, linguistic and intellectual abilities, aesthetic and artistic sensibilities as a result of involving oneself in school gardening. It is evident (Table 4) from Kruskal Wallis one-way analysis of variance that based on the total score of attitude on individual school, Government Girls Higher Secondary School, Cotton Hill, Vazhuthacaud, Thiruvananthapuram students were having more positive attitude towards the vegetable gardening activities compare to others school. There was significant difference between the attitude levels among students belonging to different schools.

CONCLUSION

Through the garden, students gain an understanding of ecosystems, knowledge of plant and at the same time, they learn practical horticultural skills that last a lifetime. Hence from the total results it was summarized that the correlation between attitude and other profile characteristics of students on school vegetable gardens affirms that student's attitude was influenced by age, class of study, purpose of involvement and training needs. There was significant difference between the attitude levels among students belonging to different schools.

Paper received on : April 05, 2020
Accepted on : April 20, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (93-95)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Research Note

Impact of Improved Sugarcane Production Technologies on Pest Incidence

S. Saravanakumar

ABSTRACT

Sugarcane is an important commercial crop cultivated over 23000 ha in Erode District of Tamil Nadu. Attempts were made to improve the productivity and reduce the pest incidence in sugarcane by adopting improved production technology called *Sustainable Sugarcane Initiatives* (SSI) practices. The experiments were conducted during *kharif* 2017 in 5 farmers' field of Poonthurai block of Erode district. The incidence of early shoot borer and red rot incidence was nil under SSI whereas incidence was noticed in the normal planting system. The cane yield was higher in SSI system with 127.5 t/ha and 108.75 t/ha in the normal planting system. 17.24 per cent yield increase was noticed over conventional system. The cost benefit ratio between the SSI and normal planting system was 2.05 and 1.73, respectively. Considering the above facts, SSI shows the reduction in pest incidence and yield advantages over conventional system of sugarcane cultivation.

Keywords: B:C ratio, Pest incidence, Sustainable sugarcane initiatives, Yield

INTRODUCTION

Sugarcane is an important cash crop in India both sociologically and economically occupying about 4 per cent of the total cropped area. Sugarcane is the central source of sugar or sucrose in India. Nearly 340 Lakh tons of canes are produced in the country shares the 22.6 per cent of the world sugar production. In Tamil Nadu, sugarcane occupies 3,46,000 ha and records annual production of 38576000 tons (Nair, 2008). The production potential of the sugarcane is declining year by year due to its susceptibility to pests and diseases. Though Tamil Nadu ranks first in productivity, this is much lower than the production potential of the crop (Waclawovsky *et al*., 2012). To meet the need of growing and the increasing demand of sugar and sweeteners for internal consumption, the production and productivity of the crop needs to be increased. Since the land is limited, development and adoption of suitable technologies is the need of the hour for managing pests and diseases and increases the yield of sugarcane.

SSI method has shown promise in addressing the water scarcity problem, high input use efficiency and reduction in environmental degradation. Similar to paddy SSI method of cultivation are more resistant to pests and diseases (Gani, 2004). However, SSI has the advantages of low setts requirement, high tillering ability, water conservation, high yielding etc. The insect pest and disease occurrence is crucial which play a major role in yield of sugarcane. The productivity of the crop could be increased by adopting the improved production technologies, management practices and suitable varieties (Ranawat *et al*., 2011). Hence, the trail was undertaken with a view to compare the pest and disease occurrence and yield of sugarcane through SSI and conventional method of sugarcane cultivation.

METHODOLOGY

The field experiments were laid out in five farmers' field during *kharif* 2017 in Poonthurai village of Erode district. The variety Co-0212 was sown under two methods

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of cultivation viz., conventional planting and sustainable sugarcane initiatives with an area of 20 cents each. The selected progressive farmers were trained on all scientific sugarcane cultivation aspects before starting of the experiments. The farmers were provided with good quality seedlings (sugarcane buds treated with recommended chemicals with the support of vaccum treatment chamber) for transplanting. The details of technologies adopted for each system of cultivations are presented in Table 1.

Incidence of early shoot borer and red rot disease was calculated by counting the number of plants infected and total number of plants in the plot by using the formula.

$$\text{Percent}\ \frac{\text{Pest}}{\text{Disease}}\ \text{Incidence} = \frac{\text{Number of plants infected in a row}}{\text{Total number of plants in a row}} \times 100$$

The fields were regularly monitored and periodically observed by the scientists of KVK. At the time of harvest yield data were collected from both the SSI and conventional method of cultivation. The cost of cultivation and profit details of both the systems were collected from the farmers for working out the benefit cost ratio. The data's were statistically analyzed by using ANOVAs.

RESULTS AND DISCUSSION

The study reveals that the adoption of SSI method of cultivation reduces the early shoot borer incidence than the conventional method of cultivation. Table 2 indicates that the early shoot borer incidence was lower (0.45%) than the conventional method, similarly the red rot incidence was not noticed in the SSI method of cultivation, since the planting materials are thoroughly treated with recommended dose of chemicals. The results are in line with Viswanathan *et al.* (2014) in sugarcane and Ravi *et al*. (2007) in paddy cultivation. Yield parameter like individual cane weight of 1.511 kg was recorded in SSI method of cultivation which was superior to the conventional method of planting (1.125 kg per cane). Table further indicates that the SSI method of cultivation recorded 127.50 ton cane yield/ha which is significantly higher the conventional method of cultivation (108.75 ton/ha). The results are in line with Kalita *et al.* (2019) and Singh *et al.* (2019)

It was found that the average cost of cultivation under SSI method of cultivation was Rs. 146000.00 / ha (Table 3) and Rs. 147500.00 /ha in conventional method of cultivation. The cost reduction in the SSI method of cultivation was mainly due to reduced planting materials as well as the reduction in pest and disease infestation. The SSI method recorded the higher mean gross return of Rs. 299625.00/ha and the net return of Rs. 153625.00/ha with the high benefit cost ratio of 2.05. These findings are in line with the findings of Hiremath and Nagaraju

Table 1: Details of technologies adopted under different system of sugarcane cultivation

Technology	Conventional system	SSI system
Planting materials used	Setts	Seedlings
Quantity of planting materials used	3 tons	5000 numbers
Age of planting	On the day of sett cutting	25 days old
Spacing	3 feet row spacing	5 x 2 feet
Organic fertilizers	FYM 12.5 ton/ha	FYM 12.5 ton/ha
Chemical Fertilizers	As per recommendations	As per recommendations

Table 2: Yield, pest and disease incidence in conventional and SSI method of sugarcane cultivation

Method of planting	Pest / Disease Incidence		Yield parameters (ton/ha)	
	Early shoot borer	Red rot	Individual cane weight	Cane yield
Conventional method	3	6.2	1.125	108.75
SSI	0.45	0	1.511	127.5
SEm±	1.725	3.1	1.318	13.26

Table 3: Economic parameters by conventional and SSI method of sugarcane cultivation

Method of planting	Gross cost (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	Benefit cost ratio
Conventional method	147500	255562.5	108062.5	1.73
SSI	146000	299625	153625	2.05
SEm±	1060.66	31156.89	32217.55	0.226

(2009) and Sreelakkshmi *et al*. (2012). These results are clearly indicated that the adoption of SSI method of sugarcane cultivation enhanced the sugarcane production and reduced the pest and disease occurrences.

CONCLUSION

There was a 17.24 percent yield increase in the SSI method of cultivation over conventional method. This improved production technology helped the farmers with reduced pest and disease infestation percent. Thus it can be concluded that the SSI method of sugarcane cultivation along with integrated crop management practices enhances the productivity of sugarcane.

Paper received on : April 10, 2020
Accepted on : April 22, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (96-98)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Research Note

Perceived Measures for Empowering Lodha Women in Odisha

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ABSTRACT

Lodha women have higher contribution for the maintenance of their family. Lodha Micro Project functioning in Suliapada and Moroda blocks in Mayurbhanj district of Odisha has implemented various activities like farm production, income generation, infrastructure development, education, health and sanitation etc. for all round development of the Lodha community. The study to seek the suggestion of women regarding enhanced empowerment showed that participatory decision making and involvement in developing infrastructures benefitting majority, community approach, programming for all families, skill training, proper utilization of resources, liasoning for credit facilities, prioritization of income generating activities and beneficiary selection with common agreement were the important suggestions of the Lodha women for income generation leading to empowerment.

Keywords: Empowerment, Income generation, Lodha micro project, Suggestions

INTRODUCTION

The Lodha women are presumed hard workers and they shoulder the major responsibilities for the maintenance of family. They are also more engaged in farm activities than their male counterparts. The Government has implemented Lodha Micro Project to change the illegal activities like theft, burglary, robbery etc. of the Lodha tribe and to bring them into the mainstream by engaging in agriculture (Panda and Guha, 2013). Therefore, the Government has facilitated them farm land, fire proof house, animals, goats and poultry birds, supply of inputs, farm implements etc. to improve their economic life. The project also organized 31 Self Help Groups in the project area in a cluster of 12 villages where income generating activities like small business, sabai rope making, poultry, goat and bee-keeping etc. were undertaken with the financial assistance from the project. Besides, fruit and forest tree plantations, silk worm rearing is also taken up involving Lodha women. Though the project has given sufficient thoughts for the upliftment of Lodha women, their economic life has not significantly improved. Several constraints are also observed in effective implementation of the programmes (Kantidas, 2012). An institutional convergence is also required for development of women (Singh *et al.*, 2014). A study was therefore, designed to invite suggestions of the Lodha women for their upliftment through Lodha Micro Project.

METHODOLOGY

Lodha micro project is functioning in a cluster of 12 villages i.e., 4 in Suliapada and 8 in Morada blocks in Mayurbhanj district in Odisha involving 976 households. A sample of 66 Lodha women from Suliapada block and 144 from Morada block covering around 20.0 per cent of the adopted families were randomly selected as the respondents to invite suggestions for effective

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Table 1: Suggestions of Lodha women

S.No.	Suggestion	Mean Score		Pooled mean score (n = 210)	Rank
		Suliapada block (n=66)	Morada block (n=144)		
I	**Community organisation**				
1.	Organising women properly	2.27	2.44	2.41	V
2.	Involving women in problem diagnosis	2.64	2.64	2.64	II
3.	Participatory decision making	2.58	2.71	2.67	I
4.	Assigning duties and responsibility	1.95	2.04	2.01	VI
5.	Community approach	2.52	2.55	2.54	III
6.	Beneficiary selection with common agreement	2.53	2.48	2.50	IV
7.	Conflict resolution	1.62	2.07	1.93	VII
II	**Infrastructure support**				
1.	Prioritization of the infrastructure	2.11	2.32	2.27	V
2.	Benefits for the majority	2.61	2.67	2.65	I
3.	Involving people in establishing infrastructure	2.53	2.60	2.58	II
4.	Skill competency in use of infrastructure	2.45	2.39	2.41	III
5.	Provision for repair and maintenance	2.18	2.22	2.21	VI
6.	Developing leaders for optimum use of the infrastructure	2.42	2.39	2.40	IV
III	**Vocational activities**				
1.	Prioritization of income generating activities	2.52	2.47	2.49	II
2.	Programming for all families	2.44	2.53	2.50	I
3.	Priority for resource poor	2.20	2.40	2.38	III
4.	Adequate programme for women	2.59	2.28	2.38	III
5.	Feasible vocations to different groups	2.08	2.02	2.04	V
6.	Immediate action on field problems	2.03	2.27	2.19	IV
IV	**Technical support**				
1.	Skill training for competency	2.55	2.51	2.52	I
2.	Exposure visit for experience	2.27	2.48	2.41	II
3.	Thorough understanding on vocation	2.23	2.31	2.28	III
4.	Competency in use of inputs and materials	2.24	2.28	2.27	IV
5.	Ensuring timely availability of quality inputs	2.14	2.28	2.24	V
6.	Linking women with source of information	1.98	1.92	1.94	VI
V	**Credit and finance**				
1.	Financial support for the activities	2.32	2.47	2.42	I
2.	Liasoning for credit facility	2.36	2.43	2.41	II
3.	Arranging subsidy facilities	2.12	2.26	2.22	III
4.	Fixing instalments as per capability	1.83	2.13	2.04	VI
5.	Flexibility in repayment	1.92	2.16	2.08	V
6.	Insurance coverage	2.18	2.23	2.21	IV

(Maximum Obtainable Score – 3)

implementation of the project. The data was collected personally with a semi-structured pre-tested schedule. Information collected on a scale of most essential, essential and not essential were analysed with score value of 3, 2 and 1 respectively to reveal the results.

RESULTS AND DISCUSSION

The Lodha community should be organized properly for the active participation for successful implementation of the programmes. As observed from Table 1, involving women in problem diagnosis, participatory decision making, community approach, beneficiary selection with common agreement and organizing women properly were the major suggestions in community organization. Lodha community is usually resource poor and the micro project has developed various infrastructures which are not being used adequately. The important suggestions towards infrastructure support stated by the respondents were developing infrastructures benefitting majority, involving people while developing infrastructures and developing leaders to coordinate for optimum use. Lodha micro project has undertaken various income generating activities as livelihood support. Such vocational activities should be feasible for its sustainability. The important suggestions of the respondents were programming for all families, prioritization of income generating activities taking into account of resource availability and market demand, priority for resource poor and women. Since Lodha women are involved more in farm activities, technical competency are more essential in comparison to male members. The data reveals that skill training, exposure visit, thorough understanding on vocation including marketing as well as competency in use of inputs and materials were the major suggestions of the respondents for smooth management of vocational activities for more income.

The socio-cultural and economic constraints compels towards use of their traditional practice. They essentially need credit support to purchase inputs and material for the management of vocational activities (Dhanasree *et al.*, 2014). Major suggestions on credit and finance were adequate financial support, liasoning for credit facilities and arranging subsidy facility by linking the activities of the developmental programmes of related departments. Unless these activities are extended, the Lodha women may discontinue the activities and switch over to their traditional activities.

CONCLUSION

Both the Central and State Government have laid emphasis for the upliftment of Lodha tribe as they are marginalized and backward. The Lodha women needs more support as they had more responsibilities for the maintenance of their family. Participatory decision making and involvement in developing infrastructures benefitting majority, community approach, programming for all families, skill training for competency in managing the vocational activities, proper utilization of resources, liasoning for credit facilities, prioritization of income generating activities and beneficiary selection with common agreement were the important suggestions of Lodha women which should be taken into consideration while formulating programmes for the empowerment of Lodha women.

Paper received on : April 25, 2020
Accepted on : May 11, 2020

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Indian Journal of Extension Education
Vol. 56, No. 2 (April-June), 2020, (99-102)

ISSN 0537-1996 (Print)
ISSN 2454-552X (Online)

Research Note

Knowledge and Adoption of Marigold Cultivation Practices of Women Farmers in Gurugram District of Haryana

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ABSTRACT

The study was conducted in Gurugram district of Haryana state. Two blocks Farrukh Nagar and Gurugram were selected randomly and from each selected block, fifty women farmers who were involved in marigold cultivation selected randomly, thus making a total of 100 respondents. The study revealed that, majority of the respondents were middle aged, having small family size, living as joint families, and having small landholding size. Majority of the respondents were found listening to radio krishi programmes as their mass media exposure. In case extension contacts majority of the respondents were found in contact with the ADO/VEW whereas risk orientation of majority of the respondents was at low level. Regarding concept, importance, harvesting, packing and marketing of marigold majority of the respondents had medium level of knowledge and adoption.

Keywords: Marigold cultivation, Women, Empowerment, Knowledge, Motivation and Adoption

INTRODUCTION

Rural women entrepreneurship is passing through a transition period. The Indian rural economy is also experiencing an entrepreneurial need. A farm business necessarily requires deliberate decision and proper investment, after assessing risks and available resources to maximize profit. Very little effort has been done on entrepreneurship development among women farmers, although, it is very useful in empowering women and enabling them to break the barriers that keep them away from commercial agriculture. There is a tremendous opportunity in floriculture trade at entrepreneurial level for women besides growing and selling cut flowers. Women can set up small enterprises where value-addition in the form of bouquets and flower arrangements can be taken up. Women play a significant and crucial role in horticultural operations such as nursery raising, planting, weeding, harvesting and seeds storage, whereas men mainly take care of marketing aspects. In our country females are 65.00 per cent of the total workforce involved in the production of flowers (Rao and Bramhanandan, 2003). An integrated postharvest management approach may help in achieving better market access, nutrition security, poverty alleviation, employment generation, environment protection and economic transformation of rural populations.

Flower cultivation has a great potential for generating remunerative self employment among the small and marginal farmers besides earning the much needed foreign exchange (Rakesh *et al.*, 2004). The survey of preference of flower cultivation revealed that men and women both gave preference to the cultivation of marigold, which was 67.60 per cent and 78.70 per cent respectively (Raghava and Saxena, 2001). Farmers need to adopt a set of postharvest technologies which are cost effective and appropriate for reducing losses by keeping perishable produce fresh for a longer period or processing them into durable products to fetch better returns on their produce. Considering the potential of floriculture in generating higher levels of income, employment opportunities, greater

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involvement of women farmers and increase in exports, it has been identified as an important focus area by the Government of India and several development schemes have been introduced. Nowadays in the urban area, females are also showing their interest to be a part of this profession and with this sector. Regarding cultivation of flower crop, marigold dominates in north Haryana. In Haryana, the area under flower cultivation covers 8200 ha of which the maximum area is under marigold i.e. 6481 ha. In Gurugram production and area in 2016 of marigold was 1020 tons from an area of 92 ha which reduced to 940 tons in 2017 from an area of 82 ha (NHB, 2016-17). The production, harvesting and marketing of traditional flowers for local marketing are typical women's activities hence the study to find out the level of knowledge and adoption of marigold practices was attempted with women respondents.

METHODOLOGY

The study was conducted in Gurugram district of Haryana. The district was selected purposely as it was found that flower cultivation is higher in that area, further, two blocks were selected, randomly from the district. From the selected blocks fifty women farmers engaged with pre and post-harvest practices were selected randomly for the study. A total of hundred respondents were finalized from the two selected blocks for the study. The respondents were requested to reply to a set of questions to ascertain their knowledge and adoption level. For the purpose of quantification of data three-score were assigned as for Full (2), partial (1) and Nil (0).

RESULT AND DISCUSSION

The data revealed that, the majority of the respondents (56%) cent belonged to the middle age group with low literacy level (68%) followed by middle level (20%) of education. It shows that the involvement of middle and young age group women members in the marigold cultivation was more than the old age group growers. It was probably because of the fact that young and middle aged people were more energetic than the old people. The majority of the respondents (80%) were living in a nuclear family system, the majority of respondents 77.00 per cent were having small family size. The findings are in line with Rajnish (2011). 48 per cent of respondents had a small size of landholding and 61.00 per cent having their occupation as agriculture and dairy. Further the risk taking ability of the majority 62.00 per cent of the women respondents was found to be which are in line with findings of Rathod (2009).

Table 1: Distribution of the respondents according to knowledge level with practices (n= 100)

S.No.	Practices		Percentage		
			Full (3)	Partial (2)	Nil (1)
1.	Recommended cultivars	African marigold	11	62	27
		French marigold	08	71	21
2.	Seed rate	400-600 gm per day	69	31	00
	Planting method	Planting done by transplanting the seedling sown during July to September	83	17	00
	Transplantation time	When seedlings are of 8-10 cm height	76	24	00
3.	Manure and fertilizer	Quantity used	38	62	00
		Time of application	89	11	00
4.	Irrigation		85	15	00
5.	Pinching	Pinching practices followed	09	78	13
		Pinching practice after 25-30 days of transplanting	00	18	82
6.	Harvesting		100	00	00
7.	Diseases and their control	Diseases	18	68	14
		Control	12	72	16

The data in Table 1 reveals that the majority of the farmers (50%) were having medium knowledge level regarding marigold cultivation followed by 30.00 per cent with low knowledge level and only 20 per cent of the farmers had high knowledge level. Study revealed that regarding marigold varieties, majority of the respondents belonged to medium level of knowledge. In case of agronomic practices, majority of the respondents belonged to low level of knowledge, majority of the respondents belonged to medium level of knowledge about manures and fertilizers application. In case of irrigation and pinching practices, the majority of the farmers had medium knowledge. Whereas, majority of the respondents had medium level of knowledge about harvesting and disease control. These findings closely resemble the findings of Chand (1994) The knowledge of the farmers regarding seed treatment, green manuring and plant protection was medium.

Table 2: Categorization of the respondents according to their knowledge regarding package of practices of Marigold Cultivation (n=100)

Knowledge	Class range	Frequency	Percentage
Low	21-26	26	26.00
Medium	27-32	62	62.00
High	Above 32	12	12.00

Table 3: Categorization of the respondents according to their knowledge regarding package of practices of Marigold Cultivation (n=100)

Knowledge	Class range	Frequency	Percentage
Low	20-24	18	18.00
Medium	25-29	72	72.00
High	Above 29	10	10.00

Results in Table 3 also indicated that regarding marigold flower varieties, the majority (72%) of the respondents belonged to medium adoption level, followed by low and high. In case of agronomic practices and manures and fertilizers application: majority of the respondents belonged to medium level of adoption. In case of irrigation and pinching practices, the majority of the farmers had low adoption, whereas, majority of the respondents have medium level of knowledge about harvesting and disease control. These findings closely resemble the findings of Ramamurthi *et al.* (1997).

The Table 4, indicates that a farmer works towards larger yields and economic profits was ranked 1st by respondents (weighted mean 4.40). A farmer should try any new idea which may earn him more money was perceived 2nd by respondents (weighted mean 4.20). The most successful farmer is one, who makes maximum profit was ranked 3rd (weighted mean 3.40), a farmer should earn his living but most important things in life cannot be defined in terms of economic conditions was ranked 4th (weighted mean 3.36), a farmer should grow cash crops to increase monetary profits in comparison of growing of food crops for home consumption was ranked 5th (weighted mean 3.26) and it's difficult for the children of farmers to make a good start unless they provides

Table 4: Distribution of the respondents according to their economic motivation (n= 100)

S. No.	Statements	Frequency					Weighted mean score
		SA (5)	A (4)	UD (3)	DA (2)	SDA (1)	
1	A farmer should work towards larger yields and economic profit	40	60	-	-	-	4.40
2	The most successful farmer is one, who makes maximum profit	-	40	-	30	-	2.20
3	A farmer try any new idea which earn him more money	38	44	18	-	-	4.20
4	A farmer should grow cash crops to increase monetary profits in comparison of growing of food crops for home consumption	-	42	42	16	-	3.26
5	It s difficult for the children of the farmers to make good start without economic assistance	-	24	52	22	02	2.98
6	A farmer should earn his living but most important things in life cannot be determined in economic terms	-	56	24	20	-	3.36

economic assistance was ranked 6th (weighted mean 2.98). The findings were found in line with the findings of Mukherjee (1997) where it was found that majority of the respondents perceived marketing as major prospects followed by quality, technical support and increase in farmers purchasing power.

CONCLUSION

The study revealed that, majority of the respondents were aware of concept, importance, harvesting, packing and marketing of marigold. In the case of agronomic practices and fertilizers application majority of the respondents belonged to a low level of knowledge. All the women farmers were found having medium adoption of the recommended package of practices. It can be concluded that training can be most important about marigold cultivation for the farmers so as to overcome the problems or constraints coming while cultivation. Training needs regarding plant protection, application of herbicides, use of water and storage of post-harvest flowers may be inferred from data.

Paper received on : April 10, 2020
Accepted on : April 18, 2020

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CONTENTS

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Research Notes

**Printed and Published by President, Indian Society of Extension Education,
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