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Indian Journal of Extension Education and Rural Development

FROM EDITOR'S DESK

It is indeed a matter of immense pleasure for me to put forward before you the current issue of IJEE & RD for the year 2022. In the present issue some 30 research papers on areas pertaining to significant contemporary issues of rural development and agricultural extension are included. The research papers related to Agriculture, Community Science, Management, Veterinary and Animal Husbandry, and Rural Development in general forms the major content of this volume. I am highly grateful to the Editorial board and Executive Editor Prof. Dhriti Solanki for her untiring and painstaking efforts in bringing out this issue in time. Prof. F.L. Sharma on Editorial Board deserves special thanks for his commendable work and shouldering the responsibility of bringing this task to reality even after his retirement. The Society put on record the sincerity, hard work and initiative taken by Dr. Sharma without whose help and cooperation, it would not have been possible to get this issue published in time. He has always been instrumental in pooling efforts of editiorial board memebers to complete the work in time keeping in view the non-impact points of NAAS. We appreciate the continuous cooperation extended by the President of the society Prof. P.N. Kalla and Vice-presidents Prof. Archna Raj Singh & Prof. B.S. Bhimawat for their guidance and help in this regard. We are grateful to Prof. N.K. Panjabi, Secretary of the society for his continuous cooperation and free hand in completing the task well in time, financial resources are never been limiting factor for the good cause of society's development. The contributors of research papers are precious and highly valued members of the society. We are heartly thankful to them for their trust in the society and sharing their research work through this platform. We expect the similar type of cooperation from the members in future too. We assure the contributors and members to come up to their expectations in the years to come. We are grateful to Dr. S.S. Sisodia, Professor & Head, Department of Extension Education, RCA for his cooperation, providing space and resources for anywork related to RSEE. Thanks are also due to Prof. Rajshree Upadhyay, Dept. of EECM, College of Community and Applied Sciences for her cooperation and concern in all matters related to this journal. Last but not the least Image Print Media deserves special appreciation and thanks for printing the journal in time.

Best regards

S.K. Sharma
Chief Editor

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INDIAN JOURNAL OF EXTENSION EDUCATION AND RURAL DEVELPMENT

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CONTENTS

ADOPTION OF ECO-FRIENDLY INPUTS AND PRACTICES FOR SUSTAINABLE MANGO CULTIVATION

P.A. Sawant* and R. P. Mahadik**

ABSTRACT

The study was conducted in Development Block, College of Agriculture, Dapoli which includes 10 villages from four tehsils *viz*, Dapoli, Mandangad, Khed and Chiplun. Two third of the mango growers had 'high' knowledge regarding eco-friendly inputs and practices while nearly one fourth and one sixth them had 'medium' and 'low' level of knowledge, respectively. Four fifth of the mango growers had 'medium' adoption level, while equal number i.e. one tenth had 'low' and 'high' adoption of eco-friendly inputs. Majority of the mango growers had not adopted relevant practices out of total 39 practices. The study imply that there is need to impart knowledge about the eco-friendly inputs to the farmers growing mango crops. The extension organizations should make focused efforts for improving the knowledge and adoption of the eco-friendly inputs identified in the study.

INTRODUCTION

Mango growers used of costly inputs like chemical fertilizers, pesticides/ fungicides, implements and machinery etc. Use of eco-friendly low cost and non cash inputs is the only option available to them to increase the production and productivity of crops to some extent. Mango is the major fruit crops in Konkan region. DBSKKV, Dapoli has recommended package of practices for cultivation of these crops, which includes use of both costly, as well as, low cost inputs. It was however, not known as to what extent the farmers growing these fruit crops had knowledge of these eco-friendly inputs and to what extent they have been using these inputs. With a view to generate data on these aspects, the present study was carried out with the following specific objectives:

1. To know the knowledge level of the mango growers about eco-friendly inputs and practices for mango crop cultivation.
2. To ascertain the adoption level of eco-friendly inputs and practices for mango crop cultivation by the mango growers.

RESEARCH METHODOLOGY

The study was conducted in Development Block, College of Agriculture which includes 70 villages from four tehsils *viz*, Dapoli, Mandangad, Khed and Chiplun. Ten villages were randomly selected. From each village, ten mango growing farmers were randomly selected. Farmers having atleast 10 bearing mango trees were selected. Data were collected from 100 mango growers by personally interviewing the respondents with the help of specially developed schedule. Data were analyzed by using suitable statistical tools and tests.

RESULTS AND DISCUSSION

The results are presented hereunder:

1. Knowledge level of the farmers about eco-friendly inputs and practices for mango cultivation

The knowledge level of the farmers about eco-friendly inputs and practices for mango cultivation is given in Table 1.

Table 1 indicates that about two third (64.00 per cent) of the mango growers had 'high' knowledge regarding eco-friendly inputs and practices. Remaining 24.00 per cent and 12.00 per cent of them had 'medium' and 'low' level of knowledge, respectively. The average knowledge score of the mango growers was 29.4, which

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Table 1. Knowledge level of the farmers about eco-friendly inputs and practices for mango cultivation

Sl. No.	Knowledge level	Respondents (N= 100)	
		Number	Percentage
1.	Low (up to 21)	12	12.00
2.	Medium (22 to 37)	24	24.00
3.	High (38 and above)	64	64.00
	Average score 29.4	**100**	**100.00**

Table 2. Adoption of eco-friendly inputs and practices for mango cultivation by the farmers

Sl. No.	Knowledge level	Respondents (N= 100)	
		Number	Percentage
1.	Low (up to 22)	10	10.00
2.	Medium (23 to 54)	80	80.00
3.	High (55 and above)	10	10.00
	Average score 38.3	**100**	**100.00**

indicated fair knowledge.

2. Adoption of eco-friendly inputs for mango cultivation by the farmers

The adoption of eco-friendly inputs and practices for mango cultivation by the farmers is shown in Table 2.

It can be observed from Table 2 that four fifth (80.00 per cent) of the mango growers had 'medium' adoption level, while equal number i.e. 10.00 per cent had 'low' and 'high' adoption of eco-friendly inputs. The average adoption score was 38.3 indicating medium adoption of eco-friendly inputs in mango crop growing.

3. Practice wise knowledge and adoption of the eco-friendly inputs in mango cultivation

The practice wise knowledge and adoption level of the eco-friendly inputs and practices in mango cultivation is presented in Table 3.

It is seen from Table 3 that 44.00 to 100.00 per cent mango growers had 'knowledge' of eco-friendly inputs recommended for 'planting and care' of mango. This was followed by 'fertilizer and manures' (54.00 to 94.00 per cent), 'pest and disease control' (60.00 to 88.00 per cent), 'harvesting, grading and transport' (44.00 to 96.00 per cent).

With regard to adoption, it was found that majority of the mango growers had not adopted relevant practices out of total 39 practices, 'planting and care' (6 out of19), ' manures and fertilizer' (2 out of 3), 'harvesting, grading and transport' (3 out of 13)

Majority (42.00 to 60.00 per cent) of the mango growers had adopted 'partially' 13 out of 19 practices under the major head 'planting and care', only one out of three practices under the major head 'manures and fertilizer' was 'partially' adopted by majority of the mango growers. Similarly, 30.00 to 52.00 per cent of the mango growers had 'partially' adopted three out of four practices recommended for 'pest and disease control'.

Further, 30.00 to 58.00 per cent of the mango growers had 'partially' adopted 11 out of 13 practices recommended for 'harvesting, grading and transport'.

Only two practices under 'planting and care'

Table 3. Practice wise knowledge and adoption of the eco-friendly inputs and practices in mango cultivation

Sl. No.	Practice	Knowledge	Full adoption	Partial adoption
1	2	3	4	5
A.	**Planting and care**			
1.	Cultivating mango in well-drained soil	100 (100.00)	44 (44.00)	48 (48.00)
2.	Selecting clean land for cultivation	100 (100.00)	46 (46.00)	50 (50.00)
3.	Cultivating improved variety of mango on 10 X 10 m distance	76 (76.00)	20 (20.00)	52 (52.00)
4.	Planting the graft in the center of the pit with earth ball	98 (98.00)	38 (38.00)	56 (56.00)
5.	Filling the pit with well decomposed FYM and good soil	98 (98.00)	38 (38.00)	60 (60.00)
6.	Keeping the joint of graft above the ground level.	98 (98.00)	42 (42.00)	24 (24.00)
7.	Removing the plastic strip or sutali which is on the graft joint	92 (92.00)	42 (42.00)	42 (42.00)
8.	For increasing the pollination and yield of Alphanso, other varieties like Kesar, Sindhu, Ratna and Goamankur should be planted at 10-15 % in Alphanso orchard.	44 (44.00)	18 (18.00)	28 (28.00)
9	Giving the support of stick to the younger grafts	100 (100.00)	40 (40.00)	58 (58.00)
10.	Making shade for the younger grafts	100 (100.00)	38 (38.00)	60 (60.00)
11.	Removing the new flushes below the graft joint	98 (98.00)	32 (32.00)	50 (50.00)
12.	Keeping the orchard clean	90 (90.00)	28 (28.00)	58 (58.00)
13.	Removing the mango blossom upto four years from planting	84 (84.00)	24 (24.00)	52 (52.00)
14.	Yield should be taken 5th year onward from planting	78 (78.00)	22 (22.00)	44 (44.00)
15.	In winter season, watering the one-year old plant once in a week, then in second year once in fifteen days and in third year, two buckets (30 lit.) in a month.	44 (44.00)	10 (10.00)	26 (26.00)
16.	In summer season, watering the plants as per above schedule, but twice.	98 (98.00)	18 (18.00)	52 (52.00)
17.	In situ method of planting no irrigation is required.	48 (48.00)	8 (8.00)	30 (30.00)

18.	For increasing yield of old orchard and for minimizing pest and diseases incidence, central opening of canopy and thinning of branches during the rest period should be done	44 (44.00)	8 (8.00)	22 (22.00)
19.	Do not keep three fruit per inflorences.	44 (44.00)	24 (24.00)	6 (6.00)
B.	**Fertilizers and manures**			
1.	F.Y.M. should be well decomposed	94 (94.00)	30 (30.00)	60 (60.00)
2.	Cleaning the land before giving the fertilizers	54 (54.00)	16 (16.00)	32 (32.00)
3.	Green manuring should be done along with fertilizer in the trench followed by covering the trench with soil.	58 (58.00)	20 (20.00)	14 (14.00)
C.	**Pest and disease control**			
1.	Orchard should be clean	68 (68.00)	30 (30.00)	40 (40.00)
2.	Un decomposed leaves and other material should be burn	60 (60.00)	28 (28.00)	30 (30.00)
3.	Disease branches should be cut and burn	60 (60.00)	30 (30.00)	28 (28.00)
4.	Loranthus should be removed immediately.	88 (88.00)	30 (30.00)	52 (52.00)
D.	**Harvesting / grading / transport**			
1.	Irrigation should be stopped one month prior to harvesting	70 (70.00)	28 (28.00)	30 (30.00)
2.	85 % mature fruits should be harvested	90 (90.00)	36 (36.00)	46 (46.00)
3.	Harvesting the fruits along with stalk intact	88 (88.00)	30 (30.00)	52 (52.00)
4.	Harvesting should be done upto 10 a.m. and after 16 pm	90 (90.00)	18 (18.00)	36 (36.00)
5.	Avoid to keep the harvested fruits in sun	92 (92.00)	40 (40.00)	48 (48.00)
6.	Harvested fruits should not be kept on most surface	52 (52.00)	24 (24.00)	32 (32.00)
7.	Care should be taken not to increase the fruit temperature	48 (48.00)	12 (12.00)	32 (32.00)
8.	Grading of fruits on weight basis.	64 (64.00)	22 (22.00)	36 (36.00)
9.	Infested and spoiled fruits should be disposed off	46 (46.00)	12 (12.00)	28 (28.00)
10	Wrapping the fruits with tissue paper or newspaper to avoid the contact between fruits and straw	44 (44.00)	8 (8.00)	16 (16.00)
11.	Fruits should be covered during transport.	96 (96.00)	30 (30.00)	42 (42.00)
12.	Transporting should be done in night.	90 (90.00)	30 (30.00)	58 (58.00)
13.	After rainy season irrigation should be avoided till blooming / flowering of mango tree	92 (92.00)	20 (20.00)	50 (50.00)

(Figures in the parentheses indicate percentage)

(42.00 per cent each), were fully adopted by maximum number of the mango growers.

CONCLUSION

1. The study concluded that nearly two third of the mango growers had medium knowledge about eco-friendly inputs of mango growers had high knowledge level about eco-friendly inputs for mango cultivation. However, with regard to adoption of eco-friendly inputs, majority of the mango growers exhibited medium level. These findings imply that there is need to impart knowledge about the eco-friendly inputs to the farmers growing mango crops. So also, these farmers should be motivated to adopt eco-friendly inputs that would help them increase fruit production by minimizing the cost.
2. The study has identified the eco-friendly inputs that are not known to and not at all or partially adopted by the and mango growers. The extension organizations should make focused efforts for improving the knowledge and adoption of the eco-friendly inputs identified in the study.

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INVENTORISATION OF VARIOUS FARMING SYSTEMS AND THEIR DIFFERENT COMPONENTS

Mamatha G. Nair*, G. Jayalekshmi and Pooja Krishna J.*****

ABSTRACT

This paper outlines the inventorisation of various farming systems and their different components. The study was carried out in the region called Kuttanad that lies in selected parts of the three districts of the state of Kerala namely, Alappuzha, Kottayam and Pathanamthitta. The region is identified as a potent agricultural area that lies below mean sea level. Types of farming systems, the components of different farming systems, distribution of various animal components among farmers and constraints perceived by the farmers of IFS Kuttanad are discussed here. Frequency, percentage analysis and weighted mean were the statistical tools used for the study. The results show that 56.67 per cent of the total surveyed farming systems in Kuttanad is rice base farming system. The main crops identified in the integrated farming systems of Kuttanad include rice, coconut, banana, vegetables, tubers and pepper. Among vegetables, cucurbits, amaranthus and cowpea are the main components while colocasia and elephant foot yam are the major components among the tubers. The animal components include, poultry, dairy, goatry units, rabbit units, piggery and duckery units. Lack of irrigation water was the major constraint of both marginal and small farmers followed by ecological problems like soil salinity acidity and flooding. However, while calculating the spearman's correlation coefficient the value obtained was 0.86 indicating that there is no significance difference between the constraints faced by both the marginal and small farmers.

INTRODUCTION

Kuttanad is the deltaic formation of four river systems namely, Pamba, Meenachil, Manimala, and Achankovil. The region is 1-2.5m below MSL and it covers three districts Kottayam, Alappuzha and Pathanamthitta (Chattopadhyay and Sidharthan, 1985). Kuttanad is the major rice production centre in Kerala and is also identified as the rice bowl of Kerala along with Palakkad. However, year-round production of rice is not practiced in Kuttanad region due to the flooding nature of its rice fields along with their highly acidic and saline soils. Hence most of the farmers in this region practice integrated farming.

An integrated farming system with available resources accessible to farmers ensures high standard of food production with minimum environmental impact even in highly vulnerable climate. It has revolutionized conventional farming of livestock, aquaculture, poultry, horticulture, agroindustry and allied sector. IFS is a reliable way of obtaining high productivity with substantial nutrient economy in combination with maximum compatibility and replenishment of organic matter by way of effective recycling of organic residues/ wastes etc. obtained through the integration of various land-based enterprises. Effective utilization of land and labour is possible within integrated farming. The following study was conducted among the selected marginal and small IFS farmers of Kuttanad. The aim of this study was to inventorise various farming systems and their different components, types of farming systems, the components of different farming systems, distribution of various animal components among farmers and constraints perceived by the farmers of IFS Kuttanad.

RESEARCH METHODOLOGY

The study was conducted in various farming systems of Kuttanad region of Kerala. Three panchayats namely Kumarakom, Nedumudi and Niranam covering Kottayam, Alapuzha and

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Pathanamthitta districts were selected for the purpose of the study. Twenty marginal and small farmers each were selected from the above three panchayats for the study thus making the sample size to be 120.

RESULTS AND DISCUSSION

1. Types of farming systems

Different types of farming systems of Kuttanad are identified and represented in Table 1.

From the Table 1 it is understood that 56.67 per cent of the total surveyed farming systems in Kuttanad is rice base farming system, followed by coconut (20%), banana (12.5%) and vegetable (10.83%) based farming systems.

In the case of rice-based farming system, Nedumudi panchayat leads with highest percentage of 65 per cent followed by Kumarakom (65%) and Niranam (47.5%) panchayats. While, considering coconut-based farming system, Kumarakom has the highest percentage of 22.5 percent followed by Niranam (20%) and Nedumudi (17.5%). In the case of banana- based and vegetable-based farming systems, Niranam panchayat having highest percentage i.e. 17.5% and 15%, respectively.

2. Components of different farming systems in Kuttanad

The details of different plant and animal components also the details of different components present in various farming systems are represented in Table 2 and Table 3, respectively.

The Table 2 gives the information about various crop and animal components found in the Kuttanad fields. The main crops identified in the integrated farming systems of Kuttanad include rice, coconut, banana, vegetables, tubers and pepper. Among vegetables, cucurbits, amaranthus and cowpea are the main components while colocasia and elephant foot yam are the major components among the tubers. The animal components include, poultry, dairy, goatry units, rabbit units, piggery and duckery units.

Table 3 has an overall representation of the four

Table 1: Distribution of different farming systems in the selected panchayats.

S. No.	Panchayat	Rice based farming system		Coconut based farming system		Banana based farming system		Vegetable based farming system	
		No.	%	No.	%	No.	%	No.	%
1.	Kumarakom (N=40)	23	57.5	9	22.5	5	12.5	3	7.5
2.	Nedumudi (N=40)	26	65	7	17.5	3	7.5	4	10
3.	Niranam (N=40)	19	47.5	8	20	7	17.5	6	15
	Total (120)	**68**	**56.67**	**24**	**20**	**15**	**12.5**	**13**	**10.83**

Table 2: Details of integrated farming system components inventorised from Kuttanad

CROP COMPONENTS	ANIMAL COMPONENTS
Rice	Poultry (hen, turkey emu, quail)
Coconut	Dairy (cow, buffalo)
Vegetables (cucurbits, amaranthus, cowpea)	Goatry
Banana	Rabbit
Tubers (colocasia, Elephant foot yam)	Piggery
Pepper	Duckery

farming systems found in Kuttanad along with various plant and animal components present in each farming system. In the case of rice-based farming system, fish, poultry, dairy, piggery and goatry activities are undertaken along with the main crop rice.

In the coconut-based farming system, the crop components include, coconut onto which pepper is trailed and tuber crops like elephant foot yam and colocasia are cultivated. Poultry, fish, dairy and rabbit farming is done in the coconut-based farming system.

In the case of banana- based farming system, the major crop components include banana and vegetables, while dairy, poultry, goatry units are also established in the farming system.

The major crops in the vegetable-based farming system are cucurbits like snake gourd and coccinia, amaranthus and cowpea. The animal components include dairy, poultry and goatry units.

3. Distribution of various animal components among farmers

The details of different animal components and their practice by farmers are given in Table 4. The various animal components include poultry, dairy, duckery, goatry, fisheries, rabbit and piggery units.

Poultry (72.5%) is the major animal enterprise practiced by the farmers followed by dairy (43.33%), duckery (36.67%), goatry (32.50%) and fisheries (22.50%). However, rabbit (3.33%) and piggery (2.5%) were the least practiced animal components.

4. Constraints perceived by the farmers

The main constraints of the Kuttanadan region were ranked by the farmers and the result is presented in Table 5.

From the Table 5 it is clear that lack of irrigation

Table 3: Details of important farming systems of Kuttanad

S.No.	Farming system	Crop component	Animal component
1.	Rice based farming system	Rice	Fish, poultry, duckery, dairy, piggery, goatry
2.	Coconut based farming system (Elephant foot yam, colocasia)	Coconut, pepper, tubers	Poultry, fish, dairy, rabbit
3.	Banana based farming system	Banana, vegetables	Dairy, poultry, goatry
4.	Vegetable based farming system	Snake gourd, coccinia, amaranthus, cowpea	Dairy, poultry, goatry

Table 4: Distribution of animal components among farmers

S.No.	Animal components	No. of farmers practiced (N=120)	Percentage (%)
1.	Poultry	87	72.5
2.	Dairy	52	43.33
3.	Duckery	44	36.67
4.	Goatry	39	32.50
5.	Fisheries	27	22.50
6.	Rabbit	4	3.33
7.	Piggery	3	2.5

Table 5: Constraints perceived by the farmers of IFS Kuttanad

Sl no.	Constraints	Marginal farmer's rank	Score	Small farmer's rank	Score
1	Lack of irrigation water	1	513	1	505
2	Ecological factors like soil salinity, acidity, flooding etc.	2	478	2	462
3	Scarcity of farm labour	3	407	5	327
4	Lack of technical advice	4	362	3	421
5	High cost of inputs	5	314	4	366
6	Lack of improved variety	8	147	6	276
7	Lack of risk taking ability	6	268	7	224
8	Irregular supply of electricity	7	210	9	145
9	Social factors in adopting piggery, poultry, goatry etc.	9	135	8	152

water was the major constraint of both marginal and small farmers followed by ecological problems like soil salinity acidity and flooding. Other constraints include scarcity of farm labour, lack of technical advice, high cost of inputs, lack of improved variety and lack of risk-taking ability. Irregular supply of electricity and social factors in adopting piggery, poultry, goatry were the least ranked constraints.

In the case of marginal farmers, lack of irrigation water, ecological factors like soil salinity, acidity, flooding etc. and scarcity of farm labour are the major constraints as perceived by the farmers.

In the case of small farmers, lack of irrigation water, ecological factors like soil salinity, acidity, flooding etc. and lack of technical advice. However, while calculating the spearman's correlation coefficient the value obtained was 0.86 indicating that there is no significance difference between the constraints faced by both the marginal and small farmers.

CONCLUSION

The Kuttanad Below Sea-level Farming System (KBSFS) is unique, as it is the only system in India that practices rice cultivation below mean sea level. Farmers of Kuttanad have developed and mastered the spectacular technique of below sea level cultivation over 150 years ago. They made this system unique as it contributes remarkably well to the conservation of biodiversity and ecosystem services including several livelihood services for local communities. Integrated Farming Systems makes the farmer competitive by achieving improvement in productivity, input use efficiency, reduction in cost of production and creation of gainful employment for rural mass along with the tackling of soil and other input related problems. But the various components that constitute the Integrated farming system differ according to location which in the sense refers to geographical factors like land and soil type, other farm input availability, farmer's economic condition and perception regarding its utility. So integrated farming system models for different locations should be standardized and popularised among farmers as it will definitely double farmer's income.

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IMPACT ASSESSMENT OF THE TRAINING PROGRAMME ON "PRODUCTION AND USE OF ORGANIC INPUTS" CONDUCTED BY KVKS OF ASSAM

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ABSTRACT

The present study was undertaken to evaluate the impact of the training programme "production and use of organic inputs" conducted by KVKs of Upper Brahmaputra Valley Zone (UBVZ) of Assam with the objectives to assess the extent of application of learning and changes taken place and to identify difficulties in the application of learning and suggest measures to overcome those. Five KVKs of UBVZ of Assam were selected purposely and a total number of 125 respondents were selected using a random sampling technique. The data were collected by means of a personal interview schedule. Proper statistical tools were employed to analyse the data. The findings revealed that the majority (94.40 %) of the respondents had applied their learning in the construction of vermin tanks and application of vermi-compost in their crop field and 85.60 per cent of the respondents use their learning on storing organic inputs scientifically, while 92.00 per cent of the respondents had mentioned that they had seen changes in slow perishability of their farm outputs vegetables and there was an improvement in soil quality as mentioned by 90.40 per cent of the respondents. The study disclosed that lack of awareness of organic farming was the main problem faced by the trainees followed by a shortage of biomass with the WMS of 2.52 and 2.46, respectively. The majority of the respondents had suggested that there should be regular markets for selling their products followed by the financial provision by Govt. for the construction of concrete tanks at the subsidised rate which ranked first and second with WMS of 2.60 and 2.58, respectively. Thus, the study will help the KVKs personal and training agencies to conduct more training programmes on specific dimensions like marketing of organic inputs and outputs, financial provisions from banking sectors and proper follow up of training in the coming days.

INTRODUCTION

With agriculture as the backbone of the Indian economy supported by the fact that nearly 67% of our population and 55% of the total workforce depend on agriculture and other allied activities. According to 2021 estimates, the agriculture sector contributed 21.82% to India's GDP. To progress in the agricultural sector, well-equipped training is necessary for the farming community to face the coming challenges in the future. Venugopalan (1992) stated that training is the act of increasing the knowledge and skill of a farmer trainee for doing a specific job.

Krishi Vigyan Kendras function as innovative institutions for imparting vocational training. Since, the time of the establishment of KVK, they have been organizing several training programmes year after year. However, carrying out training programmes year after year will not indicate their success until and unless the training programme's impact is measured in a real situation. According to Stig Kjeldsen, "training impact assessment is a tool that gathers and organizes information so that sound conclusions can be drawn and decisions can be made about what needs to be done in the workplace to enhance the impact of training on day-to-day work behaviours and attitude.

Upper Brahmaputra Valley Zones of Assam have a huge potential for organic farming. Since the emphasis of this study was on focusing on the impact

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of training at the field level, the study should contain a good number of trainees, and the records of KVKs of UBVZ reveal that there were 579 nos. of training courses conducted during the year 2014-15 to 2016-17 (3 years) with 14,274 nos. of trainees and out of which 37 nos. courses with 874 nos. of trainees were solely on "Production and Use of Organic Inputs". Hence, this training course and these five KVKs were selected for the present study to see the overall impact of these training programmes in different aspects like to what extent the trainees are applying the new learning and what the changes have taken place in their present farm situation. Are they facing any problems in applying them in their farm situations?

To understand and explain the above queries, an impact study was attempted with the following objectives: (a)To study the extent of application of learning on the selected training programme by the trainees in their farm situation and changes taking place. (b)To identify problems faced by the trainees in the application of their learning.

RESEARCH METHODOLOGY

The study was carried out in the state of Assam. A purposive cum random sampling design was followed for the selection of Krishi Vigyan Kendras and respondents. The nature of the study was ex post facto research type. Five well-functioning Krishi Vigyan Kendras of UBVZ under Assam Agricultural University viz., KVK Jorhat, Golaghat, Sivasagar, Dibrugarh and Tinsukia were selected purposively for the present study. From each KVK, twenty-five trainees attending training solely on "Production and use of organic inputs" between 2015-16 to 2017-18 were selected which makes a total of 125 (N=125) respondents. The main tool used for collecting data from the respondents in the present study was a structured schedule. The data were collected through the personal interview method. In order to assess the application of the training programme and the changes taken place, open-ended questions were asked. The responses to the open-ended questions were systematically arranged, tabulated and properly analysed by using proper statistical techniques like frequency, percentage and Rank. The problems they faced were placed in a three-point continuum as "Very serious", "Serious" and "Not so serious" with the scores of 3, 2 and 1, respectively. Weighted mean scores were calculated on each problem to rank accordingly.

RESULTS AND DISCUSSION

Assessment in the application of the learning of training: From Table 1, it was observed that construction of a scientific vermin-tank and application of vermicompost in crop field both ranked first as revealed by 94.40 per cent of the total respondents. It was the major application of learning from the training programme on organic inputs because the vermin tank can be constructed with easily available natural resources with no or low-cost involvement.

It was also revealed from Table 1 that the second major application of learning was the scientific storing of organic inputs. 85.60 per cent of the

Table 1: Assessment in the application of the learning of training

N=125

Sl. No	Application of learnings	Frequency	Percentage	Rank
1	Construction of scientific vermin tank	118	94.40	I
2	Application of vermicompost in the crop field	118	94.40	I
3	Scientific storing of organic inputs	107	85.60	II
4	Growing Green manuring crops	50	40.00	III
5	Application of Bio-fertilizer on crops and vegetables	48	38.40	IV
6	Recycling of animal wastes back into the farms.	37	29.60	V
7	Creating awareness regarding the benefits of organic farming among fellow farmers	25	20.00	VI

respondents use their learning on storing organic inputs, it may be because of its easy storing technique with less labour involvement. It was found that the third major application was the growing of green manuring crops in their field crops as mentioned by 40.00 per cent of the respondents as green manuring crops are considered a valuable input for biofertilizers. About 38.40 per cent of the respondents had applied bio-fertilizer in their field crops and vegetables which was ranked fourth. 29.60 per cent of the farmers recycle their animal waste like livestock and poultry back into their farms which are considered very good manure for soil health and which is ranked fifth lastly many trained farmers started creating awareness of the benefits of organic farming among their fellow farmers as mentioned by 20.00 per cent of respondent farmers and ranked in the sixth position.

Assessment of perceived changes after application of learning: A number of perceived changes were experienced by the farmers after the learnings of the training programme were applied in the actual field situation. As indicated in Table 2 it was observed that "slowing down the rate of the perishability of vegetables" was the major change that has been observed by the majority (92.00 %) of the respondents and it was ranked first as they had compared the perishability rate of both the vegetables growing organically and non-organically. The second rank (94.40%) was obtained in the case of "improved soil quality" as farmers experienced that the soil quality of their farm had much improved after the application of organic inputs. These findings are similar to the findings of Save (1992) and Ramesh *et al.,* (2010). Another major change was in the "improvement of crop quality" as 84.00 per cent of the respondents mentioned that the grain quality, fruit and flower size etc were much better than before. It also showed that there was an increase in crop and vegetable production which ranked fourth as mentioned by 76.00 per cent of the respondents. The respondents observed the changes in crop production before and after the application of organic inputs and were much more satisfied with the latter one. These findings are in line with the findings of Singh (2001).

Table 2 exhibited that it" requires less application of water" (40.00%) after using organic inputs which were ranked fifth and this may be because of using the organic mulching technique and other organic inputs which is in line with the study of Rahudkar and Phate (1992) It also showed that organic farming reduces soil erosion when compared to conventional farming systems as a consequence of higher soil surface cover and soil organic matter content under organic farming as revealed by (38.40%) of respondent farmers.

Moreover, there is an increase in the use of waste of natural farm resources and fewer use of pesticides in the fields of crops and vegetables as mentioned by 28.00 per cent and 12.00 per cent of the farmers respectively.

Problems faced by the trainees in the application of the learning from the training programme: Although positive changes had been noticed in the farmer's

Table 2: Assessment of perceived changes after application of learning

N=125

Sl.No.	Changes have taken place	Frequency	Percentage	Rank
1	Slow down the rate of the perishability of farm outputs	115	92.00	I
2	Improves soil quality	113	90.40	II
3	Improvement of crop quality	105	84.00	III
4	Increase crop/vegetable production	95	76.00	IV
5	Requirement of less water	50	40.00	V
6	Reduce soil erosion	48	38.40	VI
7	Increase the use of waste natural farm resources	35	28.00	VII
8	Fewer use of pesticides	15	12.00	VIII

field but very negligible changes had been noticed in their farm due to various problems faced by them in its application. Thus, an attempt was also made to examine those in the application, production and marketing of organic inputs.

From Table 3, it was revealed that respondents faced the highest problem in "Lack of awareness" which was ranked first with WMS: 2.52 as most of the farmers found it difficult to work with their fellow farmers together because most of them were not much aware of the benefits of organic farming, while "Shortage of Biomass" ranked second (WMS: 2.46). Less availability of biomass like cow dung is the new problem arising in villages and the reason is that people shift from traditional ploughing method to modern methods by using tractors, so rearing of cows decreases and also nowadays farmers shifted to tea cultivation which shows less rearing of cattle. So, all these may be the reasons for less availability of biomass. "Output marketing problems" was ranked third with WMS: 2.37. It may be due to the fact that a smaller number of private enterprises would purchase their organic products in the markets. Again "Non-availability of organic inputs in the market" and "High input cost" ranked fourth and fifth with WMS: 2.34 and 2.09, respectively because a very few agencies are dealing with the marketing of organic inputs and also their demand is not constant and that is why the cost is high which is supported by findings of Eyhorn (2007) and Valkila (2009). Most of the respondents faced problems of "inadequate supporting infrastructure" was ranked sixth with WMS: 2.04 followed by "Critical time of application" of organic inputs in their farm fields which ranked seventh with WMS: 1.84 followed by High prone to insects and pests which ranked eighth (WMS: 1.80). And finally, very few farmers got the problem of low yield which ranked ninth with WMS: 1.68. This finding goes in line with the findings of Naik (2006).

On the other hand, non-availability of the package of practices on organic farming technology, low yield of crops, high cost of labour during peak seasons, low prices of organic products in the local market, lack of coordination between various services, supply and marketing agencies were perceived as a major constraint.

Suggestive measures offered by the trainees to overcome the problems: Against those identified problems, the respondents were asked to provide their own suggestions to overcome the problems faced during the application of the learning of the training and also for further improvement of the

Table 3: Problems faced by the trainees in the application of the learning from the training programme

N=125

Sl.no.	Problems	Very Serious (3)		Serious (2)		Not so Serious (1)		WMS	Rank
		F	%	F	%	F	%		
1	Lack of awareness	80	64.00	30	24.00	15	12.00	2.52	I
2	Shortage of biomass	74	59.20	35	28.00	16	12.80	2.46	II
3	Output marketing problems	85	68.00	25	20.00	15	12.00	2.37	III
4	Non-availability of organic inputs in the market	69	55.20	30	24.00	26	20.80	2.34	IV
5	High input cost	50	40.00	37	29.60	38	30.40	2.09	V
6	Inadequate supporting infrastructure	45	36.00	40	32.00	40	32.00	2.04	VI
7	Time is critical	30	24.00	45	36.00	50	40.00	1.84	VII
8	High prone to insects and pests	28	22.40	45	36.00	52	41.40	1.80	VIII
9	Low yield	25	20.00	35	28.00	65	52.00	1.68	IX

training programmes through open-ended questions and the suggestions were placed in the three-point continuum as "Most needed", "Needed" and "Not so needed" with the scores of 3, 2 and 1 respectively. Weighted mean scores were calculated on each suggestion to rank accordingly.

It had been observed in Table 4 that the majority of the respondents had suggested "Regular markets should be there for selling of organic outputs" so that they can sell their organic products to market regularly which was ranked first with a WMS of 2.60. They also suggested that financial provision should be provided by Govt. for the construction of concrete tanks at a subsidised rate which was ranked second with a WMS of 2.58. Table 4 showed that "more research should be done to control pests and insects organically" was the third major suggestion given by farmers with WMS (2.48). This is because farmers want long term production benefits.

From the findings, it was discovered that many respondents suggested "More training programmes should be conducted on organic farming", "More awareness camps should be conducted on organic farming" and "Proper follow up of training programme should be there" which were ranked fourth, fifth and sixth with WMS of 2.46, 2.45 and 2.39 respectively. The reason for conducting more training and proper follow up of the training may be to create more awareness of the benefits of organic farming and organic products and to properly evaluate the effectiveness of the training programme

Table 4: Suggestive measures offered by the respondents to overcome the problems

N=125

Sl.no.	Suggestions	Most needed (3)		Needed (2)		Not so needed (1)		WMS	Rank
		F	%	F	%	F	%		
1	Regular markets should be there for selling organic outputs	85	68.00	30	24.00	10	8.00	2.60	I
2	Financial provision should be provided by Govt. for the construction of concrete tanks at a subsidised rate.	83	66.40	32	25.60	10	8.00	2.58	II
3	More research should be done to control pests and insects organically	76	60.80	33	26.40	16	12.80	2.48	III
4	More training programmes should be conducted on organic farming	74	59.20	35	28.00	16	12.80	2.46	IV
5	More awareness camps should be conducted on organic farming	75	60.00	32	25.60	18	14.40	2.45	V
6	Proper follow up of training programme should be there	69	55.20	36	28.80	20	16.00	2.39	VI
7	Popularize bio-fertilizer and bio-pesticides on a large scale at the village level	50	40.00	37	29.60	38	30.40	2.09	VII
8	Sufficient outlets should be there to buy organic inputs	30	24.00	45	36.00	50	40.00	1.84	VIII
9	Govt. schemes should be implemented on organic farming	28	22.40	43	34.40	54	43.20	1.79	IX

so that they can clear their doubts and problems during the application of learning. Table 4 also disclosed that "Popularize bio-fertilizer and bio-pesticides in a large scale at village level" ranked seventh (WMS: 2.09). The reason may be due to the fact that farmers want to solve the pest problems more effectively to get more yield. And finally, "Sufficient outlets should be there to buy organic inputs" followed by "Govt. schemes should be implemented on organic farming" were being suggested by the respondents which ranked eighth and ninth with WMS of 1.84 and 1.79 respectively. The respondents need more outlets because they find it very difficult to buy the right amount of organic inputs at the right price and at right time. And they are also in need of Govt. schemes to be implemented in order to get more and more farmers engaged in organic farming.

CONCLUSION

From the findings, it can be concluded that training is one of the most important parts of the development of one's knowledge and skill to utilize their own resources. The whole study gives a clear picture of the impact of the training programme on "production and use of organic inputs" on the actual field situation of the respondent farmers. The results show that most of the respondents had constructed vermin tanks and also applied vermicompost in their farming fields followed by scientific storage of organic inputs in their actual field situation. Most of the respondents had perceived changes like slowing down the rate of the perishability of farm outputs and also improving soil quality as well as crop and vegetable quality after the application of organic inputs in their field situation. But besides these, many respondents had faced problems like lack of awareness among the farmers, shortage of biomass, marketing of organic outputs which is due to lack of proper marketing channel and uniform demand. Therefore, the respondents suggested that there should be a regular market for the selling of organic outputs. They also expected to get some financial provisions from the Govt., some schemes related to organic farming etc. Thus, the study will help the KVKs personnel, training agencies and other concerned authorities to conduct more training programmes on the topics highlighting specific dimensions like marketing of organic inputs and outputs, financial provisions from banking sectors and proper follow up of training in the coming days.

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GROWTH AND INSTABILITY OF CANAL AND TUBE-WELL IRRIGATED AREA IN SOUTHERN RAJASTHAN

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ABSTRACT

Area under canal and tube well irrigation in Rajasthan has been examined through growth rate and instability analysis during 2000-01 to 2019-20, which were further divided into two sub-periods i.e., period-I (2000-01 to 2009-10), period-II (2010-11 to 2019-20) and overall period (2000-01 to 2019-20). The growth rate was calculated by fitting exponential growth function and instability was analysed by coefficient of variation (C.V.) and Cuddy Della Valle Instability index (CDVI). It concluded that the gross irrigated area under canal and tube well irrigation showed positive and significant growth rate in both the districts during period I and II. Net irrigated area with canal source in Banswara district showing positive and significant growth rate of 2.84 per cent in the period II. Tube-well irrigated area in Udaipur district was also showed affirmative and significant growth rate at 2.96 and 2.24 per cent in the period-I and II. In Rajasthan, net irrigated area under tube-well irrigation showed positive and significant growth rate at 8.87 per cent during overall period. During overall period, the canal and tube-well irrigated area in Banswara and Udaipur district *vis-a-vis* Rajasthan state emerged as highly unstable and lowest unstable during period II.

INTRODUCTION

Agriculture employing more than 50 per cent of the workforce and contributing to around 18 per cent of gross domestic product, its significance for achieving India's food security and socioeconomic development continues (Paria et al. 2021). Irrigation is main consumer of fresh water and more than 90 per cent of groundwater draft in India. Growing population coupled with food security has put extra pressure on water resources. While access to assured irrigation is essential for sustainable agricultural intensification, expanding utilization of groundwater for the equivalent and diminishing regions under surface water system are supposed to cause impressive hydro-natural imbalance. Country has reached a situation where the demand of water from various sector of economy is rapidly increasing while the supply of fresh water is constant or decreases. Irrigation is used to reduce dependence on rainfall for agriculture and to inject dynamism in India's agriculture by providing assured water supply to the agricultural sector. It increases the agricultural production through multiple cropping and also helps to achieve self-sufficiency in food security which is necessary for growing population. The major sources of irrigation in Rajasthan are canals, tanks, tube-wells and wells. The net area irrigated by all sources during 2019-20 was 88.21 lakh hectares as against 82.83 lakh hectare in 2018-19 showing an increase of 6.50 per cent.

The net irrigated area during 2019-20 constituted 48.92 per cent of net area sown in the state. Sri Ganganagar district is at the top with 6.59 lakh hectare net irrigated area sown. However, the highest percentage of the net area irrigated to the net area sown was recorded in Kota district with 98.02 per cent whereas the lowest percentage was recorded in the Churu district with 16.35 per cent

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(DES, 2019-20 GOR report).

Tube-wells, wells and canals are the major sources of irrigation in the state of Rajasthan. The net irrigated area by open wells, tube-wells and canals together accounted for 80.86 lakh hectare (about 97.62 per cent of the total net irrigated area) in 2018-19. The gross irrigated area includes the net area sown and the area irrigated more than once. Gross irrigated area by all sources during 2018-19 was 110.21 lakh hectares as against 106.04 lakh hectare during 2017-18 registering an increase of 4.17 lakh hectare (3.93 per cent). The increasing net irrigated area in Rajasthan is helping to farmers for diversified cropping pattern increment alternate opportunities for irrigation under various crops. Looking it's the importance of irrigation through various sources in present study was under taken to study the growth and instability of canal and tube-well irrigation sources in southern Rajasthan.

METHODOLOGY

The present study was based on the secondary time series data. Based on highest area under sources of irrigation viz., canal and tube- well Banswara and Udaipur districts of Rajasthan, respectively were selected for the study. The data related to area under irrigation were collected from Directorate of Economics and Statistics, Government of Rajasthan. To draw the meaningful explanation on area under irrigation sources, the study period was divided into two periods namely period-I (2000-01 to 2009-10), period-II (2010-11 to 2019-20) and overall period (2000-01 to 2019-20).

In the present study, compound growth rate was calculated by fitting exponential growth model for the time series data of area under irrigation development in Udaipur and Banswara districts *vis-a-vis* Rajasthan state over the period of time. The Compound annual growth rate was calculated by using following formula:

$$Y_t = ab^t e^{U}t$$

where,

Y_t = Area under irrigation (ha)

a = Intercept

b = Regression coefficient

t = Time variable

^{U}t = Error term corresponding to tth observation

The equation was estimated after transformed into log- linear and written as

$$\ln Y = \text{In } a + t \ln b + Ut$$

The compound growth rate was computed using their relationship:

$$R = \{\text{antilog } (\ln b) - 1\} \text{ X } 100$$

Instability analysis

The coefficient of variation was computed to measure the magnitude of variability in area which was irrigated by tube-wells and canal.

Coefficient of variation (CV): It was calculated as follows:

$$I = \frac{SD}{AM} \times 100$$

Where,

I = Instability Index (C.V.)

SD = Standard deviation

AM = Arithmetic mean

The greater the co-efficient of variation, lesser the stability in irrigated area over time and vice-versa.

The simple coefficient of variation (C.V.) often contains the trend component and overestimates the level of instability in time series data. To overcome this problem, a measure of instability is estimated by using Cuddy ? Della Valle Instability index (CDVI) which corrects the coefficient of variation.

Cuddy-Della Valle index (CDVI): It was calculated by following formula-

$$CDVI = CV \times \sqrt{(1 - R^2)}$$

Where,

CDVI = Cuddy-Della Valle Instability Index (%)

CV = Coefficient of variation (%)

R^2 = Adjusted coefficient of determination

A low value of Cuddy-Della Valle Instability index indicates low instability in irrigated area and vice-versa.

RESULTS AND DISCUSSION

Growth analysis of gross irrigated area: The results of compound annual growth rate in gross irrigated area with tube-well and canal sources in Udaipur and Banswara districts *vis-a-vis* Rajasthan state are depicted in Table 1. It was revealed from the table that gross irrigated area with canal source in Banswara district was reported positive and significant growth rate at 6.00 per cent and 2.82 per cent in the period-I (2000-01 to 2009- 2010) and period II (2010-11 to 2019- 2020), respectively. It could be due to most of the land covered by Mahi River/ dam where water drawn from this river is distributed via canal in Banswara district. The tube-well irrigated area in Udaipur district was also showed affirmative and significant growth rate at 20.26 and 6.41 per cent in the period-I and II, respectively. Bairwa *et al.* (2012), Soumya *et al.* (2014) also reported similar results in their study. It showed the water availability is a concern because groundwater irrigation contributes more than 90 per cent of the overall livelihoods of the farms.

Net irrigated area: The results of compound annual growth rate in net irrigated area with canal and tube-well sources in Banswara and Udaipur districts *vis-a-vis* Rajasthan state were worked out and are depicted in Table 2. It was revealed that net irrigated area with canal source in Banswara district was reported positive and significant growth rate at 2.84 per cent in the period II. In Rajasthan net irrigated area under canal showed positive and significant growth rate at 2.96 per cent and 2.24 per cent in period-I and period-II. There was a conspicuous decline in the canal irrigated area due to vagaries of monsoon during last few decades.

Table 1: Compound annual growth (CGR) of gross irrigated area under canal and tube well irrigation (Per cent)

Study periods	Canal		Tube-well	
	Banswara	Rajasthan	Udaipur	Rajasthan
Period I (2000-01 to 2009-10)	6.00*	3.28	20.26*	11.85
Period II (2010-11 to 2019-20)	2.82*	3.39	6.41*	5.47
Overall Period (2000-01 to 2019- 20)	3.24	3.76	14.21	8.30

*Significant at 1 % level of significance

Source: Computed from data published by DES, GOR

Table 2: Compound annual growth (CGR) of net irrigated area under canal and tube well irrigation (Per cent)

Study periods	Canal		Tube-well	
	Banswara	Rajasthan	Udaipur	Rajasthan
Period I (2000-01 to 2009-10)	5.63	2.96**	21.72*	11.01
Period II (2010-11 to 2019-20)	2.84*	2.24*	6.49*	4.47
Overall Period (2000-01 to 2019- 20)	3.50	2.82	14.65	8.87*

* Significant at 1% level of significance

** significant at 5% level of significance

Source: Computed from data published by DES, GOR

Tube-well irrigated area in Udaipur also showed affirmative and significant growth rate at 21.72 per cent and 6.49 per cent in the period-I and II. Similar findings were in lined with Bisht and Kumar (2018).

Further, results showed that the growth rate of area under tube well irrigation in Rajasthan was found to be 8.87 per cent and significant during overall period. The ground water driven agricultural production was to be increasingly under threat due to rapidly depleting groundwater level. In Rajasthan, the lack of monsoons results in water shortages, resulting in below-average crop yields.

Instability analysis: The results of instability through various methods in gross irrigated area with canal in Banswara district and Rajasthan state are presented in Table 3. It could be seen from the table that during overall period, the canal irrigated area of Banswara district emerged as unstable in context of CV (19.17 per cent) and CDVI (8.14 per cent) measures and it was lowest in context of CV (9.91 per cent) and CDVI (4.64 per cent) parameters in period-II (2010-11 to 2019-20). In case of whole state, the maximum instability in canal irrigated area was reported in overall period in context of CV (22.67 per cent) and with respect to CDVI (14.44 per cent) during period-I. Thus, the stability in gross irrigated area by canal was more in Banswara district compared to the state.

Instability analysis gross irrigated area under tube-well irrigation: The results of instability through various methods in gross irrigated area with canal in Banswara district and Rajasthan state are presented in Table 4. It could be seen from the table that during overall period, the canal irrigated area of Banswara district emerged as unstable in context of CV (19.17 per cent) and CDVI (8.14 per cent) measures and it was lowest in context of CV (9.91 per cent) and CDVI (4.64 per cent) parameters in period-II (2010-11 to 2019-20). In case of whole state, the maximum instability in canal irrigated area was reported in overall period in context of CV (22.67 per cent) and with respect to CDVI (14.44 per cent) during period-I. Thus, the stability in gross irrigated area by canal was more in Banswara

Table 3: Instability in gross irrigated area with canal irrigation in Banswara district and Rajasthan

Particulars	CV (Per cent)		CDVI (Per cent)	
	Banswara	Rajasthan	Udaipur	Rajasthan
Period I (2000-01 to 2009-10)	18.18	16.20	8.03	14.44
Period II (2010-11 to 2019-20)	9.91	10.38	4.64	3.58
Overall Period (2000-01 to 2019- 20)	19.17	22.67	8.14	10.34

CV-Coefficient of variation

CDVI-Cuddy Della Valle Instability Index

Source: Computed from data published by DES, GOR

Table 4: Instability in gross irrigated area with tube-well irrigation in Udaipur district and Rajasthan

Particulars	CV (Per cent)		CDVI (Per cent)	
	Banswara	Rajasthan	Udaipur	Rajasthan
Period I (2000-01 to 2009-10)	50.55	32.50	23.29	5.07
Period II (2010-11 to 2019-20)	22.67	15.94	13.95	2.94
Overall Period (2000-01 to 2019- 20)	63.25	42.16	21.56	8.61

CV-Coefficient of variation

CDVI-Cuddy Della Valle Instability Index

Source: Computed from data published by DES, GOR

Table 5: Instability in net irrigated area with canal irrigation in Banswara district and Rajasthan

Particulars	CV (Per cent)		CDVI (Per cent)	
	Banswara	Rajasthan	Udaipur	Rajasthan
Period I (2000-01 to 2009-10)	16.75	15.61	5.93	14.22
Period II (2010-11 to 2019-20)	9.99	7.60	4.66	4.00
Overall Period (2000-01 to 2019- 20)	20.27	17.88	6.55	9.93

CV-Coefficient of variation

CDVI-Cuddy Della Valle Instability Index

Source: Computed from data published by DES, GOR

Table 6: Instability in net irrigated area with tube-well irrigation in Udaipur district and Rajasthan

Particulars	CV (Per cent)		CDVI (Per cent)	
	Udaipur	Rajasthan	Udaipur	Rajasthan
Period I (2000-01 to 2009-10)	52.35	30.57	23.86	4.09
Period II (2010-11 to 2019-20)	23.15	13.15	14.10	27.43
Overall Period (2000-01 to 2019- 20)	64.02	22.39	22.39	8.66

CV-Coefficient of variation

CDVI-Cuddy Della Valle Instability Index

Source: Computed from data published by DES, GOR

district compared to the state. Tanuja *et al.*, (2021) were also found similar results in their study.

The instability estimated in net irrigated area with canal in Banswara district and Rajasthan state as a whole are given in Table 5. The table showed that during overall period, the canal irrigated area of Banswara district emerged as highly unstable in context of CV (20.27 per cent) and CDVI (6.55 per cent) measures and it was lowest in context of CV (9.99 per cent) and CDVI (4.66 per cent) parameters during period-II (2010-11 to 2019-20). In case of whole state, the maximum instability in canal irrigated area was reported in overall period in context of CV (17.88 per cent) and in period-I in case of CDVI (14.22 per cent).

The instability estimated through CV and CDVI in net irrigated area with tube-well in Udaipur district and Rajasthan state as a whole are given in Table 6. The table revealed that the tube-well irrigated area of Udaipur district emerged as highly unstable in context of CV (64.02 per cent) during overall period and CDVI (23.86 per cent) in period I. It was lowest in context of CV (23.15 per cent) and CDVI (14.10 per cent) parameters in period-II (2010-11 to 2019-20). In case of whole state, the maximum instability in tube-well irrigated area was reported to be 30.57 per cent CV in period I and 27.43 per cent CDVI in period II. Boyal *et al.*, (2015) were reported similar findings in growth and instability in production of cumin in Rajasthan.

CONCLUSION

Gross irrigated area under canal and tube well irrigation showed positive and significant growth rate in both the districts during period I and II. Net irrigated area with canal source in Banswara district showing positive and significant growth rate of 2.84 per cent in the period II. Tube-well irrigated area in Udaipur district was also showed affirmative and significant growth rate at 2.96 and 2.24 per cent in the period-I and II. In Rajasthan net irrigated area under tube-well irrigation showed positive and significant growth rate at 8.87 per cent during overall period. During overall period, the canal and tube-well irrigated area in Banswara and Udaipur district

vis- a-vis Rajasthan state emerged as highly unstable and lowest unstable during period II.

Thus, it needs to be addressed by overseeing proper distribution of water resource through well connected canals where, neither there should be shortage nor overflow of water. Innovation of new models in irrigation along with creating awareness and imparting education to farmers help in development of the agriculture sector. It is in this direction that research is needed to increase productivity through irrigation and water management.

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IMPACT OF KVK's CAPACITY BUILDING PROGRAMMES ON CORN PRODUCTION TECHNOLOGY WITH DRIP IRRIGATION AMONG THE FARMERS OF BARWANI DISTRICT, MADHYA PRADESH

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ABSTRACT

Corn is a staple food crop grown all over the world. Corn is a source of nutrition as well as photochemical compounds. The technology transfer through training, demonstration and extension activities has been viewed as most important critical factors for increasing agriculture production. The study was conducted in Barwani district of Madhya Pradesh due to its having maximum number of trained farmers of KVK on drip irrigation in corn production technology. In this study 60 trained and 60 untrained farmers were selected randomly, thus the total sample consisted of 120 respondents. Majority (60.00%) respondents (trained farmers) had medium category of knowledge about corn production through drip irrigation technology. Out of the total 60 untrained farmers, majority 58.33 per cent respondents had medium knowledge about drip irrigation technology in Corn production category. Majority 58.33 per cent respondents (trained farmers) had medium adoption of drip irrigation technology in corn production category and high cost of inputs was the major constraint.

INTRODUCTION

Corn (*Zea mays* L) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, Corn is known as queen of cereals because it has the highest genetic yield potential among the cereals. Due to increasing population there is more food demand, therefore corn can satisfy the food requirements as well as provide human nutrition along with number of health benefits. Corn is widely processed into various types of products such as cornmeal, grits, starch, flour, tortillas, snacks, and breakfast cereals. Corn flour is used to make chapatis or flat breads which are eaten. Among the corn growing countries, India Rank 4th in area and 7th in production.

Water is the driving force of all nature. Conserving water means using our water supply wisely and be responsible. As every individual depends on water for livelihood, we must learn how to keep our limited supply of water pure and away from pollution. Drip irrigation's popularity may continue to grow as its benefits become more evident. Increased education and awareness, the availability of more technologically-advanced products and word of mouth exposure are all keys to heightening landscape drip irrigation's role as a significant water-conserving irrigation method. Drip Irrigation is the most efficient water and nutrient delivery system for growing crops. It delivers water and nutrients directly to the plant's root zone, in the right amounts, at the right time, so each plant gets exactly what it needs, when it needs it, to grow optimally. It enables farmers to produce higher yields while saving on water as well as fertilizers, energy and even crop protection products. Drip irrigation is known to be the most efficient irrigation methods with 95-100% water use efficiency. This is compared to sprinkler systems that have 80-85% water use efficiency or flood and furrow that are 60-70% efficient. Efficiency is related to the effectiveness of the system on crop performance and eventually on yield and profitability of the farmer.

Training and education are lifetime requirement

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to improve the living standard of large number of people in the villages. The significance of training for development and mobilization of human resources energies has been recognized long back, but finding out ways for improving effectiveness of training received attention only recently. Keeping this views, Krishi Vigyan Kendra's are the grass-root level training institutions, designed for bridging the gap between the available technologies at the one end and their application for increased production at the other.

In recent years, cultivation of corn is very popular. The various extension agencies are endlessly making efforts to create awareness among the farmers about scientific cultivation of corn. Krishi Vigyan Kendra is playing major role for promoting the cultivation of corn and conducting Training programme, Exhibition, Kisan Mela, Sangosthi and other programme for dissemination of information about cultivation of corn with low cost and environmentally safe condition. The success of any training programme depends greatly on the perception of the trainees towards it. Hence it is worthwhile to assess the impact of training on cultivation of corn with drip irrigation in term of trainees' perception so that the farmers may adopt these technologies and enhance their production with low cost and environmentally safe condition. The training brings out the required change in the individuals behavior for improving his performance therefore, to determine the impact of capacity building programme on corn production technology. The present study was under taken with the following objectives:

- To study the profile of trained and untrained corn growers.
- To establish the level of knowledge and adoption of corn production technology with drip irrigation among the trained and untrained farmers.
- To examine the relationship between personal characteristics of trained and untrained farmers with their knowledge and adoption of corn production with drip irrigation.
- To find out the constraints experienced by the corn growers.

RESEARCH METHODOLOGY

In order to perform these objectives, the study was conducted during 2020-21 in purposively selected Barwani and Sendhwa blocks of Barwani district M.P, due to its having maximum number of trained farmers in corn production technology. A list of villages where training programmes on drip irrigation in corn production technology were conducted by KVK was prepared and out of which 4 villages (2 from each block) were selected randomly. A village wise list of trained farmers, who were trained about drip irrigation in corn production technology by Krishi Vigyan Kendra was prepared and from each village 15 trained and 15 untrained farmers were selected by using simple random sampling method. Thus, the total sample consisted of 120 respondents. The data were collected with the help of pre-tested interview schedule. Keeping in view the objectives of the study and to draw logical results mean, percentage, standard deviation and correlation tests was applied.

RESULTS AND DISCUSSION

A. Distribution of trained and untrained farmers according to their profile

The data in Table 1 show that that the majority of the trained farmers were of middle and young age group, educated up to middle and primary school level, had medium social participation, having small and medium size of land holding, medium range of annual income (53.33%), low and high irrigation potential, medium source of information (75.00%), medium innovativeness (58.33%) and medium cosmopoliteness (46.67%).

The data presented in Table 1 reveal that the majority of untrained farmers were in middle aged group (41.67.00%), educated up to middle and primary school level, had medium social participation (48.33%), having small size of land holding (41.67%), medium range of annual income (55.00%), low to medium irrigation potential, medium source of information (75.00%), medium innovativeness (56.67%) and medium cosmopoliteness (45.00%).

Table 1: Distribution of trained and untrained farmers according to their profile n=120

S.N.	Categories	Trained farmers n = 60	Mean	SD	Untrained farmers n = 60	Mean	SD
1	**Age**						
	Young	21 (35.00)	1.93	0.79	25(41.67)	1.88	0.84
	Middle	22 (36.67)			17(28.33)		
	Old	17 (28.33)			18(30.00)		
2	**Education**						
	Illiterate	6 (10.00)	1.91	1.10	9(15.00)	1.73	1.18
	Primary school	16 (26.67)			17(28.33)		
	Middle school	20 (33.33)			18(30.00)		
	High school	13 (21.67)			13(21.67)		
	Higher second. & above	5 (8.33)			3(5.00)		
3	**Social participation**						
	Low	23 (38.33)	1.75	0.67	24(40.00)	1.71	0.66
	Medium	29 (48.33)			29(48.33)		
	High	8 (13.34)			7(11.67)		
4	**Size of land holding**						
	Marginal	13 (21.66)	2.28	0.94	13(21.66)	2.30	0.97
	Small	24 (40.00)			25(41.67)		
	Medium	16 26.67)			13(21.67)		
	Large	7 (11.67)			9(15.00)		
5	**Annual income**						
	Low	17 (28.33)	1.90	0.68	23(38.33)	1.68	0.59
	Medium	32 (53.33)			33(55.00)		
	High	11 (18.33)			4(06.67)		
6	**Irrigation potential**						
	Low	23 (38.33)	1.98	0.87	23(38.33)	1.90	0.81
	Medium	15 (25.00)			20(33.33)		
	High	22 (36.67)			17(28.34)		
7	**Source of information**						
	Low	8 (13.33)	4.76	1.43	9(15.00)	4.71	1.49
	Medium	45 (75.00)			45(75.00)		
	High	7 (11.67)			6(10.00)		
8	**Innovativeness**						
	Low	11 (18.33)	6.05	1.70	11(18.33)	6.16	1.67
	Medium	35 (58.33)			34(56.67)		
	High	14 (23.34)			15(25.00)		
9	**Cosmopoliteness**						
	Low	11 (18.33)	2.16	0.71	23(38.33)	1.78	0.71
	Medium	28 (46.67)			27(45.00)		
	High	21 (35.00)			10(16.67)		

B. Knowledge and adoption of corn production technology with drip irrigation among the trained farmers and untrained farmers

I. Overall knowledge of corn production technology with drip irrigation among the trained and untrained farmers: The data in Table-2 show that out of the total 60 trained farmers, majority 60.00 per cent respondents had medium knowledge about drip irrigation in corn production category, while 25.00 per cent respondents had high level of knowledge about corn production through drip irrigation technology and only 15.00 percent of the respondents had low level of knowledge about drip irrigation technology in corn production. The overall mean and SD score of this category was found to be 12.66 and 3.94 respectively.

It can be also concluded that out of the total 60 untrained farmers, majority 58.33 per cent respondents had medium knowledge about corn production with drip irrigation technology category, while 28.33 per cent respondents had low level of knowledge about drip irrigation technology in corn production and only 13.34 percent of the respondents had high level of knowledge about drip irrigation in corn production technology. The overall mean and SD score of this category was found to be 10.71 and 3.64 respectively.

The t-test indicated that the mean score of trained farmers Vs untrained farmers varied significantly, from each other.

Thus, it can be concluded that majority of the trained as well as untrained farmers were in medium category regarding knowledge about drip irrigation in corn production technology. Wadge et al (2018) and Ranawat et al (2012) also reported majority of the respondents had medium level of knowledge.

II. Overall adoption of corn production technology with drip irrigation among the trained and untrained farmers: The data compiled in Table-3 reveal that out of the total 60 trained farmers, majority 58.33 per cent respondents had medium adoption of corn production with drip irrigation technology category, while 21.67 per cent respondents had high adoption of corn production with drip irrigation and only 20.00 percent of the respondents had low adoption of drip irrigation in corn production technology. The overall mean and SD score of this category was found to be 8.77 and 3.53 respectively.

It can be also concluded that out of the total 60 untrained farmers, majority 55.00 per cent respondents had medium adoption of corn production with drip irrigation technology category, while 33.33 per cent respondents had low adoption of corn production with drip irrigation and only 11.67 percent of the respondents had high adoption of drip irrigation in corn production technology. The overall mean & SD score of this category was found to be 7.54 and 3.47 respectively. The t-test indicated that the mean score of trained farmers Vs untrained farmers varied significantly, from each other.

Thus, it can be concluded that majority of the trained as well as untrained farmers were in medium category regarding adoption of corn production with drip irrigation. Wadge et al (2018), Ranawat et al (2012) and Chouhan et al. (2013) also revealed that majority of the respondents found in medium category of adoption.

Impact- After Intervention of KVK, more than 30 percent of the area of corn crop covered under drip irrigation and overall area of corn crop is also increased. More than 70,000 ha. area is covered under corn crop in Barwani district (Source- Deptt. of Agriculture).

C. Relationship between personal characteristics of trained and untrained farmers with their knowledge and adoption of corn production technology with drip irrigation

It is evident from the Table-4 that out of nine independent attributes of trained farmers i.e. education, social participation and innovativeness were found significantly releted with knowledge about corn production with drip irrigation at 1% level of significance while size of land holding, irrigation facility, source of information and

Table 2: Distribution of the trained and untrained farmers according to their knowledge about corn production technology with drip irrigation

S.N.	Categories	Trained farmers	Percentage	Untrained farmers	Percentage
1	Low	09	15.00	17	28.33
2	Medium	36	60.00	35	58.33
3	High	15	25.00	8	13.34
	Total	**60**	**100.00**	**60**	**100.00**
	Mean	**12.66**		**10.71**	
	SD	**03.94**		**03.64**	
	t	**02.021***			

*significant at 0.05 level of probability

Table 3: Distribution of the trained and untrained farmers according to their adoption of corn production technology with drip irrigation

S.N.	Categories	Trained farmers	Percentage	Untrained farmers	Percentage
1	Low	12	20.00	20	33.33
2	Medium	35	58.33	33	55.00
3	High	13	21.67	07	11.6
	Total	**60**	**100.00**	**60**	**100.00**
	Mean	**08.77**		**07.54**	
	SD	**03.53**		**03.47**	
	t	**02.002***			

*significant at 0.05 level of probability

cosmopoliteness had non-significant relationship with knowledge about corn production technology at 5% level of significance.

It is revealed that in case of untrained farmers, out of nine independent attributes, only education, social participation, size of land holding, annual income, irrigation potential and source of information were significantlt related with knowledge about corn production with drip irrigation while age, innovativeness and cosmopoliteness were had significant relationship with knowledge about corn production technology.

In case of trained farmers, Table 5 shows that out of nine independent attributes, education, social participation, land holding, source of information, innovativeness and cosmopoliteness were found significantly related with adoption of corn production with drip irrigation at 1% level of significance and rest of the attributes had found significant relationship with adoption of corn production technology at 5% level of significance except age.

It is revealed that in case of untrained farmers, out of nine independent attributes, only age and cosmopoliteness had non-significant relationship with adoption of corn production with drip irrigation and rest of the attributes had significant relationship with

Table 4: Relationships between profile of trained and untrained farmers with their level of knowledge about corn production technology with drip irrigation.

S. N.	Attributes	Trained farmers		Untrained farmers	
		Correlation coefficient 'r'	t-value	Correlation coefficient 'r'	t-value
1	Age	0.031NS	0.311	0.112NS	1.012
2	Education	0.728**	8.328	0.562**	5.311
3	Social participation	0.339**	2.651	0.377**	2.913
4	Size of land holding	0.214*	1.831	0.261*	2.142
5	Annual income	0.254*	2.082	0.259*	2.125
6	Irrigation potential	0.283*	2.332	0.313*	2.426
7	Source of information	0.279*	2.295	0.332*	2.772
8	Innovativeness	0.316*	2.446	0.118 NS	1.455
9	Cosmopoliteness	0.248*	1.874	0.128 NS	1.060

** Significant at 1% level of probability; * Significant at 5 % level

Table 5: Relationships between profile of trained and untrained farmers with their level of adoption about corn production technology with drip irrigation.

S. N.	Attributes	Trained farmers		Untrained farmers	
		Correlation coefficient 'r'	t-value	Correlation coefficient 'r'	t-value
1	Age	0.040 NS	0.320	0.176NS	1.285
2	Education	0.621**	5.893	0.546**	5.092
3	Social participation	0.362**	2.910	0.315*	2.473
4	Size of land holding	0.399**	3.274	0.318*	2.464
5	Annual income	0.239*	1.791	0.315*	2.508
6	Irrigation potential	0.264*	2.342	0.264*	2.078
7	Source of information	0.294*	2.084	0.388**	3.137
8	Innovativeness	0.347**	3.004	0.107 NS	2.045
9	Cosmopoliteness	0.388**	2.698	0.056 NS	0.414

** Significant at 1% level of probability; * Significant at 5 % level

adoption of corn production technology.

D. Constraints experienced by corn growers both trained and untrained farmers

Multiple responses were taken to ascertain the constraints faced by the corn growers both trained and untrained farmers in production and marketing of corn. Various constraints are presented in Table 6. Maximum number of respondents reported high cost of inputs as major constuent (78.33%). In the next order, non availability of labor was accounted by 73.33 per cent corn growers. High wages of labor was also serious constraint which was faced by 71.67 per cent corn growers. In the next order, abnormal weather condition was one of the major problem which was articulated by 50.00 per cent corn growers.

Table 6: Constraints faced by corn growers both trained and untrained farmers

n=120

SN	Particulars	f	%	Rank
1	Timely unavailability of inputs	37	30.83	VI
2	High cost of inputs	94	78.33	I
3	non availability of labor	88	73.33	II
4	high wages of labor	86	71.67	III
5	Abnormal weather conditions	60	50.00	IV
6	High weed infestation	35	29.16	VII
7	Low price for Corn	52	43.33	V

Another constraint low price for grain was expressed by 43.33 per cent corn growers they need minimum support price for output. Another constraint was high weed infestation which was expressed by 29.16 per cent and 30.83 per cent corn growers were facing constraint of timely unavailability of inputs. The findings of Chahal and Katariya (2010) and Krishana et al (2018) were in the same line of the present finding.

CONCLUSION

KVK is playing most important role in dissemination of technology. Majority 60.00 per cent respondents (trained farmers) had medium knowledge about corn production with drip irrigation category. Out of the total 60 untrained farmers, majority 58.33 per cent respondents had medium knowledge about corn production with drip irrigation category. Majority 58.33 per cent respondents (trained farmers) had medium adoption of drip irrigation technology in corn production category. Out of the total 60 untrained farmers, majority 55.00 per cent respondents had medium adoption of with drip irrigation corn production category. Education was found very important factor and it had highly significant with knowledge and adoption of trained farmers. High cost of inputs was the major constraints reported by 78.33 per cent corn growers. As evinced in this study, drip irrigation is an important viable technology for water conservation, labor saving and to overcome water stress during drought situations.

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CONSTRAINTS EXPERIENCED BY FARM WOMEN IN PARTICIPATION AND DECISION MAKING IN Bt. COTTON CULTIVATION

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ABSTRACT

The present study was conducted in Rajsamand and Railmagra Tehsils of Rajsamand district of Rajasthan to identifi the constraints of women in participation and decision making pattern in Bt. Cotton cultivation practices. Total 120 respondents were randomly selected for data collection. The data were collected personally through structured interview schedule. Findings of the study revealed that higher time consumption for household activities, high cost of farm material, lack of female extension staff for guidance in agricultural activities, poor economic status of the family, lack of technical know how about Bt. cotton cultivation were expressed as most severe constraints by the farm women in Bt.cotton cultivation.

INTRODUCTION

Women play a significant role in agriculture. In the world, about 70 per cent of the agricultural workers, 80 per cent of the food producers and 10 per cent of those who process basic food stuffs are women and they also undertake 60 to 90 per cent of the rural marketing, thus making up more than two-third of the work force in agricultural production. The scenario of agriculture has completely changed with change in time but from centuries one thing that didn't change is the visualization of women as key labour in this industry. Agriculture sector as a whole has developed and emerged immensely with the infusion of science and technology, but this latest emergence is not capable of plummeting the ignorance of women labour as an integral part of this industry. In developing countries like India, agriculture continues to absorb and work force but fails to employ two third of the female give them recognition of employed labour. The Female labour force in developing nations still faces the oppressive status of being majorly responsible for family and household maintenance. Efforts were put to collate and categorize the states of identical behaviour in Indian agriculture by hierarchical clustering of economically active female in agriculture. Looking to the importance of farm women in agriculture, the present study was undertaken with the following specific objectives:

1. To determine the constraints being faced by farm women in participation and decision making in Bt. cotton cultivation.
2. To compare the constraints faced by the farm women of both the selected Tehsils of Rajasthan district.

RESEARCH METHODOLOGY

The present study was conducted in purposely selected Rajsamand district of Rajasthan. Rajsamand district is situated in southern part of Rajasthan. Rajsamand district consists of seven tehsils, out of which two tehsil namely Rajsamand and Railmagra tehsil were selected on the basis of the highest area and production under Bt. cotton cultivation and from these two tehsils 10 villages were selected on the basis of highest area and production of the Bt. cotton. From each selected village, 12 farm women were identified on the basis of random sampling technique. Thus, total 120 respondents were selected for present investigation. Data were collected through pre-structured interview schedule. Thereafter, data were analysed and results were interpreted, in the light of the present study.

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RESULTS AND DISCUSSION

The constraints under present investigation were considered as major impediments that restrict the farm women in the participation and decision making in Bt. Cotton cultivation. The results about constraints are present in subsequent tables. To know the level of constraints, the respondents were divided into three groups *viz.*, least important constraint (<35.41 score), important constraint (35.41 to 40.19 score) and most important constraint (>40.19 score) on the basis of calculated mean and standard deviation of the obtained constraints score by the respondents. The distribution of respondents are given in Table 1.

Table 1 reveals that out of 120 respondents, majority (71.66%) of farm women belonged to important level of constraint group whereas, 16.66 per cent respondents possessed least important level of constraints and remaining 11.66 per cent of farm women had most important level of constraints about participation and decision making in Bt. cotton cultivation practices.

Further analysis of Table 1 shows that 16 (26.67%) and 4 (6.67%) farm women of Rajsamand and Railmagra tehsils observed in least important group, respectively. Whereas, 42 (70.00%) and 44 (73.33%) respondents of Rajsamand and Railmagra tehsils were found in important constraints group, respectively. Further analysis of table shows that 2 (3.33%) and 12 (20.00%) respondents of Rajsamand and Railmagra tehsils were facing most important level of constraints, respectively. From the above discussion it may be concluded that more than 80.00 per cent farm women were perceived important to most important level of constraints about participation and decision making in Bt. cotton cultivation practices in the study area.

An effort was made to find out the priority of constraints faced by the respondents in participation and decision making in Bt. cotton cultivation practices. For this MPS for each constraint was calculated and ranked accordingly. The results of the same have been given in Table 2. Table 2 indicates that "higher time consumption for household activities" was expressed as most important constraint by the farm women with 96.94 MPS and it was ranked first by the respondents. The second important constraint faced by the farm women in participation and decision making in Bt. cotton cultivation was "lack of marketing facilities" with the extent of 93.33 percent. Likewise, the problem related to "high cost of farm materials" was also expressed as major constraint by the farm women as indicated 92.50 MPS and ranked third by the respondents. Table 2 further shows that "poor economic status of the family", lack of female extension staff for guidance in agriculture activities, "lack of technical knowhow about Bt. cotton cultivation", "poor educational background of the women", and "lack of support & guidance from family members for taking decision" were also serious constraints expressed by the farm women in decision-making and participation in different operations and activities of Bt. cotton cultivation.

Table 1: Level of constraints perceived by farm women

n=120

S. No.	Constraints category	Rajsamand tehsil		Railmagra tehsil		Total	
		f	%	f	%	f	%
1.	Least important (<35.41)	16	26.66	4	6.66	20	16.66
2.	Important (35.41 to 40.19)	42	70.00	44	73.33	86	71.66
3.	Most important (>40.19)	2	3.33	12	20.00	14	11.66
	Total	**60**	**100**	**60**	**100**	**120**	**100**

F = frequency, % = per cent

The mean percent score of these constraints was 90.55, 89.44, 88.61, 87.50 and 84.44, respectively.

Analysis of table also indicates that "lack of proper guidance from Govt. officials for taking decision", "poor self-confidence of women in making farm decision", "lack of information about government scheme" and "lack of knowledge about farm accounting" were also perceived the important constraints by the respondents with the extent of 82.77, 81.66, 80.55 and 78.33 percent, respectively. Whereas, the constraints namely "lack of experience of farming", "dominance of the male members in the family" and "no permission to take decision due to young age" were expressed least priority constraints by the farm women in the study area. Lack of proper guidance from Govt. officials for taking decision, poor self-confidence of women in making farm decision, lack of information about government scheme and lack of knowledge about farm accounting were also perceived the constraints by the farm women.

Tofind out the significance of difference between the farm women of selected tehsils with respect to the constraints being faced by farm women in Bt.

Table 2: Constraints faced by the farm women in participation and decision making in Bt. cotton cultivation practices

n=120

S. No.	Constraints	Rajsamand tehsil		Railmagra tehsil		Total	
		MPS	RANK	MPS	RANK	MPS	RANK
1.	Higher time consumption for household activities	95.00	I	98.88	I	96.94	I
2.	Dominance of the male members in the family	68.33	XIII	81	XII	74.72	XIV
3.	Poor economic status of the family	89.44	IV	91.66	III	90.55	IV
4.	Lack of female extension staff for guidance in agricultural activities	90.55	III	87.33	VIII	89.44	V
5.	Poor self-confidence of women in making farm decision	80.55	VII	82.77	XI	81.66	X
6.	Lack of technical know-how about Bt. Cotton cultivation	88.88	V	88.33	VII	88.61	VI
7.	Lack of experience of farming	75.55	XII	75.68	XIV	75.55	XIII
8.	Lack of proper guidance from Govt. officials for taking decision	78.33	IX	87.22	IX	82.77	IX
9.	Poor educational background of the women	84.44	VI	90.55	IV	87.50	VII
10.	Lack of knowledge about farm accounting	78.88	X	77.77	XIII	78.33	XII
11.	No permission to take decision due to younger age	58.88	XIV	67.77	XV	63.33	XV
12	Lack of information about government schemes	76.11	XI	85.00	X	80.55	XI
13.	Lack of support and guidance from family members for taking decision	80.00	VIII	88.88	VI	84.44	VIII
14.	High cost of farm material	94.00	II	90	IV	92.50	III
15.	Lack of marketing facilities	89.58	III	96.11	II	93.33	II

MPS= Mean percent scorer

Table 3: Comparison of the constraints faced by farm women of Rajsamand and Railmagra tehsils regarding Bt. Cotton cultivation

n=120

S. No.	Category of respondents	Mean	S.D.	Size of sample	'Z' value
1.	Respondents of Rajsamand tehsil	36.91	2.43	60	4.44**
2.	Respondents of Railmagra tehsil	38.7	1.96	60	

**Significant at 1per cent level of significance

cotton cultivation, 'Z' test was applied.The results are presented in Table 3.

Table 3 shows that the calculated value of 'Z' (4.44) is more than its tabulated value at 1 per cent level of significance. It may be concluded that there was significant difference between constraints being faced by farm women in participation and decision making of two selected tehsils with respect to Bt. cotton cultivation. By comparing the mean score, the respondents of Railmagra tehsil were facing more constraints than respondents of Rajsamand tehsil.

CONCLUSION

From the above results it can be concluded that that higher time consumption for household activities, high cost of farm material, lack of female extension staff for guidance in agricultural activities, poor economic status of the family, lack of technical know how about Bt. cotton cultivation were expressed as most severe constraints by the farm women in Bt.cotton cultivation.

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ATTITUDE OF VEGETABLE FARMERS TOWARDS SAFE HANDLING OF PESTICIDES IN THIRUVANANTHAPURAM DISTRICT OF KERALA

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ABSTRACT

A study was conducted in the vegetable tracts of Thiruvananthapuram district of Kerala, to analyze the attitude of vegetable farmers towards the safe handling procedures of pesticides. A sample of 120 respondents were selected from each Agro Ecological Unit (AEU) of Thiruvananthapuram. Ex - post facto research design was used. It was observed that about 57.5 per cent of the respondents had medium level of attitude towards safe handling of pesticides. The result of correlation analysis revealed that the attitude was positively and significantly correlated with source of information, training received and perception about health risk.

INTRODUCTION

Agriculture has a prestigious role in Indian economy, it is the main source of livelihood for more than 61.50% of the population in India (Agriculture census of India, 2011). It is contributing about 23% of country's GDP (FAO, 2017). India occupies second position in vegetable production. Around 58.7% of total horticulture production is contributed by vegetables. Totally a 35-40% of vegetable crop loss is occurring due to pest infestation (Sardana, *et al.*, 2005). Pest outbreaks and their consequences were the major curb faced by the farmers in India. The usage of pesticide starts during 1948 and today India stands in the 11th position globally (FAO, 2021). Pesticides causes several severe health hazards especially to those directly exposed to it. Reports shows 30,00,000 poisoning cases and 2,20,000 deaths annually due to pesticides (WHO, 1990). Unscientific use of pesticides, lack of knowledge about pesticides and improper disposal mechanism elevate the severity of the situation. Considering the need for understanding the farmers behaviour towards this situation, the present study was undertaken with the objective to assess the status of attitude of vegetable farmers towards the safe handling of pesticides and also its relationship with various socio-personal characteristics of the farmers.

RESEARCH METHODOLOGY

Four Agro Ecological Units (AEU's) in Thiruvananthapuram were selected out of five for the study. One is avoided as because it is not a major vegetable tract. From the four AEU's two panchayaths were selected purposively which was having maximum area under vegetable cultivation and 15 respondents were selected from each panchayaths randomly making a total of 120 respondents. The respondents were administered with pretested, structured questionnaire and through survey data collection was done. Ex-post facto research design was adopted for the study. Independent variables like age, education, source of information, farming experience, labour availability, economic orientation, risk orientation, environmental orientation, perception about health risk, and innovativeness were selected based on judges rating. The dependent variable of the study was attitude of vegetable farmers towards the safe handling procedures of pesticides. The scale in a five point continnum developed by Jasna (2018) was used for assessing the attitude of the farmers. There were 19 statements, and the responses were obtained in a Likert scale of strongly agree, agree, undecided, disagree and strongly disagree, and the score was given 5, 4, 3, 2 and 1, respectively. Total score was calculated by taking the sum of scores of

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all the 19 statements and the score varied from 50 to 78. Further it was classified into low, medium, and high by using quartile deviation. Also, the correlation coefficient between attitude of vegetable farmers towards following the safe handling procedures of pesticides and the socio- personal characteristics of the vegetable farmers in Thiruvananthapuram district were estimated.

FINDINGS AND DISCUSSION

Attitude of vegetable farmers towards the safe handling procedures of pesticides was the dependent variable of the study. It is evident from Table 1 that majority of the farmers were having medium level of attitude towards safe handling procedures of pesticides (57.5%), followed by high (22.5%) and low (20%) level of attitude towards safe handling procedure of pesticides.

Table 1: Distribution of respondents based on attitude towards safe handling procedure of pesticide

S. No.	Category (years)	f	p
1	Low (<62)	24	20
2	Medium (62 to 70)	69	57.5
3	High (>70)	27	22.5

Q1 = 62 **Min = 50**

Q3 = 70 **Max = 78**

Mean = 65.9

SD = 5.7

The possible reason for this type of distribution may be because most of the respondents have been trained regarding pesticide effects and its safe handling and their source of information were highly reliable and their perception about health risk had positive impact on their attitude. The findings were in line with the studies of Amle (2016), Choudhary (2010) and Mishra (2016).

A correlation study was done to analyze the relationship of the profile characteristics of farmers with their attitude towards safe handling procedures of pesticides. Correlation coefficient was calculated for finding the significance. The factors that associated with the attitude towards safe handling procedures of pesticides are presented in the Table 2.

Table 2: Factors associated with the attitude towards safe handling procedure of pesticides

N=120

Sl.no.	Independent variables	r
1	Age	0.017
2	Farming Experience	-0.033
3	Economic Orientation	0.094
4	Environment Orientation	0.09
5	Source of information	0.241*
6	Risk Orientation	0.13
7	Innovativeness	0.029
8	Perception about health	0.256 *
9	Training received	0.238 *

* -significant at 0.05 level

From the above table, it is clear that variables like perception about health risk, training received, source of information had positive and significant relationship with attitude of the farmers about safe handling of pesticides at 0.05 per cent level of significance. Conversely other variables like age, farming experience, economic orientation, environmental orientation, risk orientation and innovativeness were not significantly related with the attitude of the farmers. Here, the analysis reveal that the respondents with high perception about health risk, training received, and source of information also had high attitude towards safe handling procedure of pesticides.

Perception about the health risk is a significant factor that contribute to the greater attitude towards the safety practices. A person who is conscious about health and health risks will have good attitude towards safety practice while handling pesticides. So, the result obtained is logical and because of the perception about health risks the respondents had more favorable attitude towards the safety

Table 3: Factors associated with the attitude towards safe handling pesticides

N=120

Sl.No.	Categorical variables		Low/Medium	High	2	p
1	Education					
		<=10th	72	24	1.72	0.190
		Above 10th	21	3		
2	Labour availability	Hired labour	26	10	0.91	0.634
		Family labour	46	11		
		Hired + family labour	21	6		

measures. Training received is the most significant factor for improving the attitude especially in the case of safety practices a person who had undergone more number of trainings will definitely have more favorable attitude than others who hasn't undergone any training. The farmers who got quality trainings on safety practices had favorable attitude towards the handling of pesticides. So, the result obtained is logical and because of the training received the respondents had more positive attitude towards the safety. Source of information is also a significant factor that influence the attitude of the farmers. Proper and good quality source of information will always elevate the attitude of the people.

A chi square analysis was done to find the relationship of the profile characteristics of farmers with attitude towards safe handling procedure of pesticides. It was calculated for finding the significance. The factors that associated with the attitude towards safe handling procedures of pesticides are presented in the Table 3.

From the table, we can see that variables education and labour availability doesn't had any significant relationship with the farmer's attitude towards the safe handling procedure.

CONCLUSION

The paper examined the attitude of vegetable farmers in following the safe handling procedures of pesticides. The study has clearly shown that majority of the respondents had medium level of attitude towards safe handling of pesticides. The correlation analysis indicated that variables such as source of information, perception about health risk and training received has positive and significant relationship with the attitude of farmers towards safe handling of pesticides. Whereas, age, education, farming experience, labour availability, economic orientation, risk orientation, environmental orientation, and innovativeness were non-significant. Focus should be to contemplate over the right socio personal variables that can influence the attitude of the vegetable farmers towards the safe handling of pesticides. Efforts should be taken to increase the level of attitude of farmers in the safe handling of pesticides through effective extension interventions like focused training and demonstrations, providing subsidies and easy access to the safety equipment's. These would construct and augment the positive attitude in farmers about the proper utilization of safe handling procedure of pesticides.

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IMPACT OF CLIMATE CHANGE ON AGRICULTURE AND ALLIED ACTIVITIES IN ARAVALLI REGION OF RAJASTHAN

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ABSTRACT

Climate and agriculture are intensely interconnected with global processes. Even a small change in climate has adverse affect on agricultural activities. The present investigation was carried out in Rajasthan Aravalli region. Data were collected on related parameters from 240 farmers of Udaipur, Bhilwara, Chittorgarh and Rajsamand districts of Rajasthan. The respondents expressed that the farm practices like sowing time, pesticide use and overall health of the crops cent percent negative impact of climate change on agriculture in Aravalli reason. Whereas, more than 85 per cent of the respondents observed negative impact on the agricultural practices like crops grown (87.50%), cropping pattern (86.66%) and number of irrigations (85.41%). No effects of climate change was found only on FYM application (78.75%) and seed treatment (72.50%). However, the result of impact of climate change on allied activities indicates that almost cent per cent of the respondents were of the view that effect on human health (99.16%), effect on drinking water availability (98.33%), adverse effect on livestock health (97.91%) and horticultural crop production (95.83%), pollutions are increasing (94.16%), extent of milk yield (93.33%).

INTRODUCTION

Climate change is one of the biggest challenges to the world in present times. It is defined as significant changes in the average values of meteorological elements, such as precipitation and temperature, for which averages have been computed over a long period (WMO, 1992). The past few decades indicate that significant changes in climate at a global level were the result of enhanced human activities that altered the composition of the global atmosphere (IPCC, 2007). As greenhouse-gas emissions in the atmosphere are increasing, global warming will be above 2°C by mid 2100s. The temperature is also rising due to the greenhouse effect, with every 1°C rise in temperature, there will be a 7 per cent increase in the intensification of extreme rain events (IPCC, 2018). United Nations environment programme (UNEP) declared that Carbon dioxide (CO2) is the principal cause of climate change because of its highest contribution in global warming. Assessment of the effects of global climatic variations on agriculture is imperative to adapt farming and to enhance agricultural production (Fraser et al., 2008). The average global temperature has increased at an average rate of 0.15-0.20 °C per decade since 1975 (NASA Earth Observatory, 2020), and is expected to increase by 1.4-5.8 °C by 2021 (Arora, et al. (2005). The average annual temperature of the earth's surface has risen over the last century, According to the (NOAA, 2019). Increase in the mean seasonal temperature can reduce the duration of many crops and hence reduce final yield. In areas where temperatures are already close to the physiological maxima for crops, warming will impact yields more immediately (IPCC, 2007b).

In India majority of the population depends on agriculture directly or indirectly. Agriculture is more dependent on monsoon from the ancient periods. There are two major crop growing season in India as for climate point of view e.i. Kharif and Rabi crops. Rajasthan is the largest state of country and entire State receives scanty rainfall. In more recent

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times, has experienced severe and frequent spells of droughts than any other region in India. The region's climate is projected to become harsher, with increased average temperatures, intensity of rainfall events, and increased variability in space and time of monsoon rains being consistently projected for the region. Rajasthan has reason to be concerned about the impact of climate change as its large population depends upon climate-sensitive sectors like agriculture and forestry for livelihood. The Aravalli hill region of Rajasthan served its area and the people as a rich resource area providing forest products, fuel wood, fodder, timber, water through springs, streams and rivers, minerals, rich forest clad habitat, safe and secured locations to former rulers and their public. Aravalli region of Rajasthan and depletion of environmental resources particularly, vegetation, soil resources have led to decline to water-table, high air and soil temperature, intense solar radiation and high wind velocity. Impact of climate change is not directly visible in the sub humid southern plain and Aravalli hill zone, but there is no doubt that there are some potential impacts that are still unknown, that can adversely affect the Aravalli regions as well.

RESEARCH METHODOLOGY

The present study was carried out in Sub-humid southern plain & Aravali hill zone, (Agro-ecologically the district has been part of Zone-IVA), namely of Udaipur, Bhilwara, Chittorgarh and Rajsamand districs of Rajasthan to know the perception of farmers about climate change and its impact on agriculture and allied activities. This region has Sub-humid climate and the soils of grey brown loam, medium black, moderately deep and medium to heavy in texture. The average annual rainfall of the region is 852 mm. with majority of it received during mid-June to end of September. A sample of 240 farmers was selected randomly from 2 villages of 8 panchayat samities. The data were collected with the help of structured interview schedule. The present study comes within the purview of survey research mainly to 'Ex-post facto in nature. Different statistical meanner like percentage, frequency were followed.

RESULTS AND DISCUSSION

Impact of climate change on agriculture and allied activities: Climate change impact and associated vulnerabilities are of particular to developing countries where large parts of the population depend on climate sensitive sectors like agriculture for livelihood. Impact of climate change at local level is difficult to assess due to poor understanding of microclimate. Most of the farming communities cannot classify the concept climate change but are good at describing changes in weather and its impact. Farmers were asked about changes occurred in agriculture and allied activities according to their past experiences as impact of climate change. Different impacts experienced by farmers due to climate change are given in the following Table 1.

Majority of the respondents reported that climate change has resulted in negative impact on most of the agricultural practices. For some of the farm practices no impact was expressed by the respondents. Farm practices like sowing time, pesticide use and overall health of the crops was cent percent negative impact. Similarly farm operations like soil fertility, disease infestation, grain yield quality and grain yield quantity also had negative impact as expressed by majority of the respondents (more than 90%).

More than 85 per cent of the respondents observed negative impact on the agricultural practices like crops grown (87.50%), cropping pattern (86.66%) and number of irrigations (85.41%) and no effect was mentioned by 11.66, 13.33 and 14.58 per cent, respondents, respectively.

More than 60 per cent of the respondents view negative impact for use of chemical fertilizer (70.83%), land preparation (68.75%), market price (61.66%) and seed rate (60.41%). Practices like variety selection and spacing, received mixed responses i.e. negative impact 49.16 per cent and 47.91 per cent and no effect 50.83 and 52.08 per cent, respectively.

Majority of the respondents mentioned that climate change had no effect on FYM application (78.75%) and seed treatment (72.50%) and negative effect was expressed by 21.55, 27.50 per cent, respondents, respectively. The finding is in accordance with the findings reported by Shiva Prasad (2016).

Farmers were asked about changes occurred in agriculture and allied activities according to their past experiences as impact of climate change, sixteen agricultural/allied activities were included in the study (Table 2). The results indicate that almost cent per cent of the respondents expressed nagative effect of climate change on human health (99.16%), drinking water availability (98.33%), livestock health (97.91%), horticultural crop production (95.83%), increased pollution (94.16%), extent of milk yield (93.33%) and animal and livestock reared (92.50%).

The equal per cent of respondents (93.75%) viewed negative effect on vegetable crops production and fish production. It can be seen from Table 2 that more than 70 per cent of the respondents revealed that negative impact was on

Table 1: Distribution of respondents according to their views about impact of climate change on agriculture

(n=240)

S.No.	Farming practices	Impact of climate change					
		Positive		Negative		No Impact	
		f	%	f	%	f	%
1.	Soil fertility	00	0.00	235	97.91	05	2.08
2.	Crops grown	02	0.83	210	87.50	28	11.66
3.	Cropping pattern	00	0.00	208	86.66	32	13.33
4.	Variety selection	00	0.00	118	49.16	122	50.83
5.	Land preparation	00	0.00	165	68.75	75	31.25
6.	Sowing time	00	0.00	240	100	00	0.00
7.	Spacing	00	0.00	115	47.91	125	52.08
8.	Seed rate	00	0.00	160	60.41	95	39.58
9.	Seed treatment	00	0.00	66	27.50	174	72.50
10.	FYM application	00	0.00	51	21.55	188	78.75
11.	Use of chemical fertilizer	00	0.00	170	70.83	70	29.16
12.	Time of application	00	0.00	221	92.08	19	7.91
13.	Insect, pest infestation	00	0.00	219	91.25	21	8.75
14.	Disease infestation	00	0.00	232	96.66	08	3.33
15.	Pesticide use	00	0.00	240	100	00	0.00
16.	No. of irrigations	00	0.00	205	85.41	35	14.58
17.	Harvesting	00	0.00	223	92.91	17	7.08
18.	Grain yield quality	00	0.00	232	96.66	08	3.33
19.	Grain yield quantity	00	0.00	235	97.91	05	2.08
20.	Market price	00	0.00	148	61.66	92	38.33
21.	Overall health of crop	00	0.00	240	100	00	0.00

Table 2: Distribution of respondents according to their views about impact of climate change on allied activities

(n=240)

S.No.	Allied activities	Impact of climate change					
		Positive		Negative		No Impact	
		f	%	f	%	f	%
1.	Horticultural crop production	00	0.00	230	95.83	10	4.16
2.	Vegetable crops production	00	0.00	225	93.75	15	6.25
3.	Fruits production	00	0.00	210	87.50	30	12.50
4.	Fish production	00	0.00	225	93.75	15	6.25
5.	Quality of fish production	00	0.00	175	72.91	65	27.08
6.	New species found and old species extinct in rivers	00	0.00	160	66.66	80	33.33
7.	Forest conservation	05	2.08	148	61.66	87	36.25
8.	Animal and livestock reared	00	0.00	222	92.50	18	7.50
9.	Species of some animal and bird has extinct	00	0.00	210	87.50	30	12.50
10.	Adverse effect on livestock health	00	0.00	235	97.91	05	2.08
11.	Extent of milk yield	00	0.00	224	93.33	16	6.66
12.	Availability of local fodder	07	2.91	210	87.50	30	12.50
13.	Scarcity of fodder in the local area	00	0.00	177	73.75	63	26.25
14.	Pollutions are increasing	00	0.00	226	94.16	14	5.83
15.	Effect on drinking water availability	00	0.00	236	98.33	04	1.66
16.	Effect on human health	00	0.00	238	99.16	02	0.833

fruits production (87.50%), species of some animal and birds extinct (87.50%), availability of local fodder (87.50%), scarcity of fodder (73.75%) and quality of fish production (72.91%) and no impact was recorded by the for same practices by 12.50, 26.25 and 27.08 per cent, respondent, respectively.

Negative impact and no impact were expressed by respondents on new species found and old species extinct in rivers (66.66 and 33.33%) and forest conservation (61.66 and 36.25%). However some respondents expressed positive impacts on forest conservation (2.08%) and availability of local fodder (2.91%).

Most serious impact of climate change expressed by the respondents was pollution and scarcity of fodder. The finding is in accordance with the findings expressed by Nayak et al. (2019).

CONCLUSION

The results conclude that the climate change will bring about changes in weather patterns, river systems, crop yields and impact on human health. Climate is closely related to human and economic activities including agricultural system. Some changes in climate will affect on agriculture through their direct and indirect effects on crops, livestock, fisheries etc. Tropical countries are likely to be affected more as compared to the temperate countries. The brunt of environmental changes is expected to be very high in India due to greater dependence on agriculture, alarming increase in human and livestock population, changing pattern in land use and socio-economic factors that create a great threat in meeting the food, fibre, fuel and fodder requirement.

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CONSTRAINTS AND SUGGESTIONS IN ADOPTION OF MPOWER'S INTERVENTIONS AMONG RURAL COMMUNITIES OF WESTERN RAJASTHAN

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ABSTRACT

Poverty reduction is quite possible in PPP mode, it was observed during a study entitled 'Impact Assessment of MPOWER's Livelihood Interventions through Agriculture and Horticulture, on Income Enhancement and Socio-Economic Status of Target Groups of six district of western Rajasthan during the year 2017-18. The results are described in Social, Economic and Technical aspects and found that respondents increased their annual income (32%) through agriculture and horticulture interventions compared to that recorded before inception of the project. It was noted that there is a great need to provide the farm inputs through village level cooperative societies to adopt the various interventions. It is necessary to have a technical service centre for scientific solution for production problems. The interventions should be replicated in other part of Rajasthan.

INTRODUCTION

Mitigating Poverty in Western Rajasthan (MPOWER) is a poverty reduction initiative that is supported by the International Fund for Agricultural Development (IFAD) within its framework of the current Country Strategic Opportunities Paper (COSOP), Sir Ratan Tata Trust (SRTT) and the Government of Rajasthan. The lead implementing agency is the Department of Rural Development (DRD), Government of Rajasthan, through it umbrella society for all livelihood projects in the State-Rajasthan Grameen Ajeevika Parishad - RGAVP. The Centre for Micro Finance (CMF) is the nodal agency as well as the Lead Resource Agency for the project. The project with an estimated investment of USD 62.54 million is being implemented over a six-year period. The Project Management Unit has been set up at Jodhpur. The project areas of MPOWER fall in the hot and arid and semi-arid districts of Rajasthan. It was felt that the performance of this project should be assessed in terms of the impact on the target groups amongst the targeted districts, therefore, a memorandum of understanding (MoU) was signed for undertaking a study entitled 'Impact Assessment of MPOWER's Livelihood Interventions through Agriculture and Horticulture, on Income Enhancement and Socio-Economic Status of Target Groups' between MPOWER, Jodhpur and Agriculture University, Jodhpur with a total out-lay of Rs 12.31 lakhs. Both the parties agreed mutually to conduct the study pursuant to assess the impact of the MPOWER project on livelihood generation through agriculture and horticulture interventions in the seven blocks of Western Rajasthan with special reference to change in economic benefits after adoption of MPOWER project.

RESEARCH METHODOLOGY

The study was conducted by Agriculture University Jodhpur in the six district of western (MPOWER programme implemented area) Rajasthan during the year of 2017-18. A questionair was developed to collect the primary information on agriculture intervention. The information as mentioned in questioner was recorded by the team members after interacting with the respondents. The study was conducted in seven blocks namely Bap, Balesar (Jodhpur), Abu Road (Sirohi), Bali (Pali), Sanchor (Jalore), Baitu (Barmer) and Sankara (Jaisalmer) of targeted districts were selected to collect the primary data on agricultural intervention.

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Total 15 (10%) clusters out of 150 clusters have been selected by lottery method. Out of the 5250 beneficiaries, 525 beneficiaries (10% of the total beneficiaries in 15 Clusters) were selected by the lottery method for the study. The collected data was converted into soft copy by coding and decoding. Further, processed and analysed by using simple mathematical tools like average, percentage, frequency and the pivot tables according to the objectives of the study.

RESULTS & DISCUSSION

Large number of demonstrations on major crops of the area during kharif and rabi seasons in the selected blocks on the fields of beneficiary respondents were undertaken with the objective of assessing the impact of improved production technologies for enhancement in productivity of these crops and monetary returns there of which were compared with that obtained from non-beneficiary farmers. The results so obtained from the beneficiary are described in the following paragraphs.

A. Social

Different interventions under the project strengthened the grassroot institutions, community infrastructure development, drudgery reduction, employment generation for the field level cadre of Krishi Sakhi and Krishi Mitra. Large numbers of SHGs which are working for social up-liftment of farm women became functional. Additional incomes so generated on account of interventions are utilized for purchase of household domestic goods, thus improving the standard of living.

B. Economic

Beneficiary respondents increased their annual income (32%) from all the sources after inception of this project including agriculture and horticulture interventions compared to that recorded before inception of the project. These interventions under the project are helpful in creating marketing facilities at local level and development of financial recourses for the women belonging to BPL families. The additional incomes generated by various interventions are utilized for purchasing milch animal which act as a regular source of farm income. Beneficiary respondents created permanent assets like drip & sprinkler units, barbed wire fenced fields; insect proof shed-nets, sprayers and dusters in some blocks.

c. Technical

The beneficiary respondents have adopted the recommended high yielding improved cultivars of different crops to replace the local varieties, planting sole cropping instead of mixed one and line sowing through seed drill rather than broadcasting seed with harrowing. The beneficiary farmers are now following the recommended crop rotation, sole cropping after treating seeds with the help of seed drums at cluster level. Production technologies disseminated through organizing demonstration at beneficiarys' fields had enhanced income from kharif and rabi crops ranged from 17.6% to 102 % in comparison to that of non-beneficiary farmers. Arid fruits orchards of ber, lasura (Gunda), pomegranate and lemon were established successfully in Baitu, Sankara, Baap, Sanchor, Abi Road and Bali blocks, thus enhancing livelihoods. On the basis of soil health cards, farmers have begun to use balanced fertilization thereby saving the fertilizer and reducing cultivation costs. Pressurized irrigated systems (drip or sprinkler) are being followed in Sanchor, Bali and Abu Road blocks for raising cash crops, vegetables and fruit plants to save irrigation water. Irrigated areas of Sankara, Balesar, Abu Road and Bali blocks have great potentiali to grow vegetables on a commercial basis for enhancing people livelihoods and increasing income.

Constants faced by beneficiaries:

A list of possible constraints was compiled in consultation with the experts. The severity of each constraint was measured on a two-point continuum i.e. Yes or No. The responses of respondents were analysed and findings are reported in Table 1. Data reveal that the majority of the beneficiary respondents (75%) were of the opinion that non-availability of seeds, saplings/seedlings and other agricultural inputs, and services at local level in time

are the major constraints. There is a great need to provide the farm inputs through village level cooperative societies to adopt the various interventions. About 61% respondents were of the view that the high cost of improved seeds, fertilizer and pesticides are hurdles in adoption of agriculture and horticulture interventions. The third constraint reported by 45% respondents is that of inadequate credit facilities from banks to purchase high cost agricultural inputs. Lack of technological guidance at the proper time ranks fourth constraint, which was observed by 39% beneficiary respondents. Thus, there is a need for effective adoption of the project interventions. Other constraints like training opportunities to understand effectiveness and importance of introduced intervention, inadequate awareness about the advantage of project, lack of systematic campaigns for popularizing the project, nepotism and favouritism in distribution of inputs under MPOWER project, lack of competence of project implementing staff in conducting the demonstrations etc. are of little importance.

Suggestions for Improvement

The important suggestions were given by both categories of respondents for improvement in the successes of the project and also to make the interventions more effective.

a. Beneficiary Respondents

The opinion of the beneficiary respondents was collected on the selected ten suggestions *viz*. exposure on new interventions in their nature setting before introduction, training on recommended Package of Practices (PoP) of selected crops of the region, training on plant protection measures, construction of rain water harvesting with animal sheds, up-gradation of the catchment areas of RWH structures based on annual rainfall, formation of SHG for male beneficiary, fencing of the demonstration plots of horticulture crops and vegetables for avoiding damages from stray cattle and wild animals like pigs, posting of agriculture trainer in each block, establishment of Agriculture Service & Resource Centre at district Level and improvement in weather based crop insurance schemes in the project area. The responses of the respondents are presented in the Table 2. Across the blocks, the 92% beneficiary respondents expressed top-most priority to arrange more training programmes on the recommended PoP of the selected crops of the region, followed by providing fencing of the demonstration plots of fruit plants and vegetables (86% respondents) as second preference because the open grazing systems is prevailing in the most of the project area. The third important suggestion made by 83% respondents was to provide training on plant protection measures of major crops especially on vegetables and horticultural crops (Table 3). However, beneficiary respondents emphasised for the construction of rain water harvesting with animal sheds, establishment of Agriculture Service & Resource Centre at district Level and formation of SHG for male beneficiary as last priorities (VIII, IX and X). As regards to Block-wise response, the beneficiaries from Abu Road suggested that training should be organized on recommended PoP of selected crops followed by fencing of the demonstration plots of fruit plantation and vegetables and specialized training on plant protection measures, while respondents from Baitu preferred to arrange training on recommended PoP of selected crops and appointment of agriculture trainer at block level. The response of the respondents was more or less the same on other suggestions in other blocks.

b. Non- Beneficiary Respondents

The opinions of the Non-beneficiary respondents were collected through interaction and FGD (Table 3). On the basis of their suggestions, it was revealed that all respondents wanted technical guidance to be provided to all farmers on scientific methods of cultivation followed by giving every respondent the chance of taking benefit of training & exposure and modification in weather based crop insurance scheme on a priority basis. 82% respondents expressed their view to create market facility for input & output (IV priority) and lastly to get the benefit of the project to be given to all needy farmers (V rank). Block-wise suggestions of the respondents were very interesting because

Table 1: Constraints faced by the beneficiary respondents

Particulars	Abu Road	Baap	Baitu	Balesar	Bali	Sanchor	Sankara	Total	Rank
	%	%	%	%	%	%	%	%	
Non-availability of seeds, saplings/seedlings and other agricultural inputs and services at local level timely	96	67	60	86	94	89	56	75	I
Inadequate knowledge of soil treatment	70	17	14	43	66	44	24	36	V
Lack of knowledge about seed treatment	6	27	11	26	14	40	29	20	VI
Nepotism and favoritism in distribution of inputs under MPOWER Projects	7	19	6	3	11	11	9	9	X
Lack of technological guidance at proper time	3	77	38	23	30	51	46	39	IV
High cost of improved seeds, fertilizers, pesticides are hurdles in adoption of interventions	83	80	54	26	70	73	30	61	II
Lack of competence of project implementing staff in conducting the demonstrations	3	7	9	11	3	14	16	9	XI
Skeptics about success of new interventions	7	7	12	3	7	1	11	8	XII
Difficult to know impact of intervention due to not maintaining Record	3	7	8	9	6	9	14	8	XIII
Inadequate credit facilities from banks to purchase high cost agricultural inputs	61	39	39	40	63	21	57	45	III
Lack of training opportunity to understand effectiveness and importance of introduced intervention	6	30	12	40	4	17	29	17	VII
Inadequate awareness about the advantage of MPOWER project	1	36	4	9	9	23	14	13	VIII
Lack of systematic campaign for popularizing the MPOWER project	1	19	6	11	10	7	26	11	IX
Adequate number of demonstrations were not arranged to motivate the farmers through MPOWER project	1	13	4	9	1	4	13	6	XIV

Source: Author's own computation based on surveyed data

Table.2: Suggestions of Beneficiary for Improvement

SN.	Suggestion	Abu Road %	Baap %	Baitu %	Balesar %	Bali %	Sanchor %	Sankara %	Total %	Rank
1.	Exposure on new interventions in their natural setting before introduction	99	53	90	80	81	84	54	79	IV
2.	Training on recommended PoP of selected Crops	100	64	100	94	60	97	97	92	I
3.	Training on plant protection measures	99	93	69	89	86	64	97	83	III
4.	Construction of rain water harvesting with animal sheds	86	80	78	71	66	67	89	77	VIII
5.	Up-gradation of the catchments areas of RWH structures based on annual rainfall	87	79	87	80	79	80	56	79	VII
6.	Formation of SHG for male beneficiary	84	57	69	60	60	70	70	68	X
7.	Fencing of the demonstration plots of Horticulture and Vegetable	100	73	97	86	74	83	79	86	II
8.	Appointment of Agriculture Trainer on each block	93	64	100	57	57	56	83	78	VI
9.	Establishment of Agriculture Service & Resource Centre at district Level	79	54	78	69	69	63	79	71	IX
10.	Modify the existing weather based crop insurance schemes in the project area	97	60	87	63	84	69	80	79	V

Table.3: Suggestions of non-beneficiary for improvement

S.N.	Suggestion	Abu Road %	Baap %	Baitu %	Balesar %	Bali %	Sanchor %	Sankara %	Total %	Rank
1.	The benefit of the project to be given to all needy farmers	41	89	88	31	100	86	80	78	V
2.	Everybody should get chance to take the benefit of training & exposure	91	97	91	89	100	100	74	92	II
3.	Market facility for input & output to be created	93	76	74	71	87	86	94	82	IV
4.	Provide technical guidance for all farmers on scientific methods of cultivation	100	100	100	100	100	100	100	100	I
5.	Modify the existing weather based crop insurance scheme	100	94	93	89	96	90	79	92	III

respondents from Balesar and Abu Road opined to create a market facility for input and output at the local level and should be part of the project (Table 4). Other suggestions were similar to those observed across the blocks.

c. All Respondents

1. Education and Training of Farmer

Through education and training on Good Agricultural Practices, the farmers should be encouraged to improve farming techniques, use scientific methods to increase productivity and enhance their skills. Proper education system would eliminate superstition, conservatism and ignorance among farmers and it would be easier to increase the productivity by the development of these human qualities.

2. Fencing of Agricultural land

Provision for the fencing of demonstration plots is of utmost importance. A good fence provides a physical barrier to control the movement of stray animals and keeping away wild animals from entering their plots to avoid damages. The importance of fencing is more in the project area because open grazing practice has prevailed in the area for a long time therefore, it is the prime need to protect the demonstrations by suitable fencing materials and protect the crops from the attack of wild animals.

3. Training on Plant Protection Measures

Crop protection is the science and practice of managing plant diseases, weeds and other pests that cause considerable loss to agricultural crops. Agricultural crops include field crops, vegetables and fruits. The crops in field are exposed to many factors. The crop plants may be damaged by insects, birds, rodents, fungus, bacteria, etc.

Thus, crop protection training encompasses:

- Pesticide-based approaches such as herbicides, insecticides and fungicides
- Biological pest control approaches such as cover crops, trap crops and beetle banks
- Barrier-based approaches such as agro-textiles and bird netting
- Animal psychology-based approach such as bird scares
- Biotechnology-based approach such as plant breeding and genetic modification

4. Exposure on New Interventions in Their Natural Setting before Introduction

Exposure visits enable farmers from different regions to interact with and learn from each other, allowing them to view practical examples of successful integration of sustainable practices in farming communities like their own. The interested and enterprising farmers would also need to be given exposure of successful interventions of the same projects within the State. This would go a long way in ensuring replication of activities in large numbers leading to success of the project. The relevant FNGO could select representative farmers linked to project activity exposure visits. The exposure visits can be arranged in batches, each batch comprising 30 farmers.

5. Expansion of Credit Facilities

To increase agricultural productivity, it is essential to expand the credit facilities appropriately. This would help the farmers to fulfil their short, medium and long term financial requirements easily. All efforts should be made to provide credit facility to farmers quickly and economically.

6. Improvement of irrigation Facilities

Agriculture in Western Rajasthan is often called a gamble of rains. More emphasis should be given to store every drop of rain. The improved rain harvesting structures should be developed and suitable modifications in the present RWH structures are needed. A network of irrigation facilities should be spread. The small irrigation plans, wells and tube-wells system should be expanded on preference basis in safe zones.

7. Plant Protection Scheme

Arrangements should be made to protect the crop/vegetables/fruit plants from insects and diseases. The farmers should be educated on the

efficient use of insecticides, pesticide and Good Agriculture Practices. The arrangements should be made to increase their use in the current cropping system. Development of research work relating to diseases should be done for the benefit of peasants from these researches.

8. Technical Suggestions

To increase agricultural productivity, it is necessary to have a technical service centre for scientific solution for production problems. Agricultural productivity can be increased on the basis of these technical suggestions. Beside this farmer are to be promoted for use of community seed drums (For seed treatment and improved threshing floor) The respondents should be motivated for the use of improved cultivars of field crops, suitable arid and semi-arid fruits and vegetables and adoption of their production technologies through pre-seasonal training and regular field visits by joint diagnostic team visit of SAU scientists and officers from Agriculture Department. Visits of master trainers from SAUs should also be arranged for the solution of specific field problem. The crop plants infested with pests and diseases should be sent to Plant Health Clinic at Agricultural Research Station for diagnosis and their remedial measures.

9. Expansion of Marketing Facilities

Making the marketing system better and lawful to remove its defects would increase profitability. When the farmers receive a fair price for their produce, they will perform the production activity more efficiently and skilfully.

10. Encouraging Cooperative Farming

To increase productivity and make the agricultural system progressive, cooperative farming should be rapidly expanded. Cooperative farming would help the farmer to rectify the present uneconomical methods of farming.

11. Reduction in Malnutrition

Effective efforts should be made to improve the health of farmers. The system of proper and balanced diet and health facilities should be established. Only healthy farmers can attain the objective of increasing productivity. Lack of efficiency of unhealthy farmers results in low productivity, it can be removed only by improvement in health facilities through backyard/ tube well gardening and establishing mini-orchards for family consumption.

12. Proper and Quick Implementation of Land Reforms

Proper and quick implementation of land reforms should be done, so that the farmers are encouraged to bring in some basic improvements. Elimination of mediators and permanent ownership of land to farmers must be done immediately.

13. Modification in the Existing Weather Based Crop Insurance Scheme

The existing weather based crop insurance scheme has several defects which need to be rectified at the State/National level. This would not only reduce the risk about the uncertainty of production but also prove helpful to get reseanable compensation under natural calamity.

CONCLUSION

Looking at the encouraging impacts of Agriculture and Horticulture interventions in the selected blocks, same may be replicated in remaining blocks in these six districts. Models of livelihood (farm based) executed by MPOWER in western Rajasthan can be proved as catalyst for doubling farmers income by integrating them with non-farm activities of the rural areas. Project interventions strengthened the grassroots institutions, community infrastructure drudgery reduction, employment generation for Krishi Sakhi and Krishi Mitra. Large numbers of SHGs of farm women became functional. Additional incomes generated on account of interventions were utilized for purchase of household domestic goods, thus improving the standard of living. Beneficiary respondents increased their annual income (32%) from all the sources after inception of this project. These interventions under the project are helpful in creating marketing facilities

at local level and development of financial recourses for the women belonging to BPL families. Beneficiary respondents created permanent assets like drip & sprinkler units, barbed wire fenced fields; insect proof shed nets, sprayers and dusters in some blocks and beneficiaries adopted the recommended high yielding improved cultivars of different crops to replace the local varieties, planting sole cropping instead of mixed one and line sowing through seed drill rather than broadcasting seed with harrowing. The beneficiary following crop rotation, sole cropping. Production technologies enhanced income from kharif and Rabi crops ranged from 17.6% to 102 % in comparison to that of non-beneficiary farmers. Pressurized irrigated systems (drip or sprinkler) are being followed in Sanchor, Bali and Abu Road blocks for raising cash crops, vegetables and fruit plants to save irrigation water. Looking at the encouraging impacts of Agriculture interventions, same may be replicated other region.

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ASSOCIATION BETWEEN PERSONAL ANTECEDENT VARIABLES AND ADOPTION OF ECO-FRIENDLY MANAGEMENT PRACTICES OF MANGO BY THE MANGO ORCHARDISTS

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ABSTRACT

The present study was conducted in Ratnagiri & Sindhudurg districts of south Konkan in Maharashtra to study the association between personal, socio-economic, psychological and communication variables and adoption of eco-friendly management practices of mango by the mango orchardists. To find out the association between personal, socio-economic, psychological and communication variables of respondents *viz.*, age, education, area under mango, experience in mango cultivation, annual income, yield of mango, scientific orientation, market orientation, innovativeness, information seeking behaviour and knowledge about ill effect of pesticides & chemical fertilizers and adoption of eco-friendly management practices of mango, chi-square test was applied. Results indicated that personal, socio-economic, psychological, communication variables of the respondents *viz.*, education, experience in mango, annual income, yield of mango, scientific orientation, market orientation innovativeness, information seeking behaviour and knowledge level of ill effects of pesticides and chemical fertilizers were significantly associated with adoption of eco-friendly management practices. On the other hand variable like age and area under mango were not significantly associated with adoption of eco-friendly management practices of mango. Therefore, the scientists, policy makers and administrator should consider them while formulating approaches, strategies and methodology for increasing adoption level of eco-friendly practices for sustainable production.

INTRODUCTION

Independent variable play important role in progress of any person. Knowledge and adoption was mainly depend on personal, socio-economic, psychological and communication variables. The association between personal, socio-economic, psychological and communication variables and adoption of eco-friendly management practices of mango by the respondents provide road map to the extension agencies for planning the suitable strategies for promotion of eco-friendly practices in the study area. Hence, the present study was proposed with the following specific objective:

1. To find out the association between personal, socio-economic, psychological and communication variables and adoption of eco-friendly management practices of mango by the mango orchardists.

RESEARCH METHODOLOGY

The present study was conducted in Ratangiri and Sindhudurg districts of south konkan in Maharashtra. The two districts, four tehsils and 20 villages were selected on the basis of maximum area under mango cultivation. Ten mango orchardists were selected randomly from each village. The 200 mango orchardist were interviewing with special designed interview schedule. The statistical tools percentages, standard deviation and frequency were used. To find out the association between personal, socio-economic, psychological and communication variables of respondents *viz.*, age, education, area under mango, experience in mango cultivation,

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annual income, yield of mango, scientific orientation, market orientation, innovativeness, information seeking behaviour and knowledge about ill effect of pesticides & chemical fertilizers and adoption of eco-friendly management practices of mango, chi-square test was applied. The calculated chi-square value was compared with table value at 1 and 5 per cent level of significance to draw the inferences.

RESULTS AND DISCUSSION

Chi-square test was applied for this purpose of the association between adoption level of mango growers with the personal antecedent variables *viz.*, age, education, area under mango cultivation, experience in mango cultivation, annual income, yield of mango, scientific orientation, market orientation, innovativeness, information seeking behaviour and knowledge about ill effects of pesticides and chemical fertilizers. The mango growers were categorized into low, medium and high groups on the basis of calculated mean and standard deviation of the adoption scores obtained by the respondents. The mango growers were also categorized into three groups on the basis of their age, education, area under mango cultivation, experience in mango cultivation, annual income, yield of mango, scientific orientation, market orientation, innovativeness, information seeking behaviour and knowledge about ill effects of pesticides and, chemical fertilizers for applying chi-square test. The stratification was based on the mean value and standard deviation of these personal attributes of mango growers. Here in Table 1, the chi-square values are presented.

The analysis of the data in Table 1 indicate that the calculated chi-square value (6.73) was lower than its tabulated value at 1.00 per cent level of significance and 4 degrees of freedom in age and adoption level. It means there is no statistically significant association between age of mango growers and adoption of eco-friendly management practices. It means that in mango cultivation age do not play a significant role in adoption of eco-friendly management practices. The findings are in line with findings of Dayama (2000) who reported that age was found to be non-significantly associated with adoption level of aonla growers about improved practices of aonla plantation.

Further analysis shows in case of education that calculated chi-square value (21.70) was greater than the tabulated value at 4 degrees of freedom and 1 per cent of significance. This shows that education and adoption of eco-friendly management practices of mango are associated. Hence, it is

Table 1: Association between adoption level of mango growers with the personal antecedent variables

Sl No.	Personal antecedent variables and adoption of eco-friendly management practices of mango	Chi-square test
1.	Age and Adoption level	6.73NS
2.	Education and Adoption level	21.70**
3.	Area under mango cultivation and Adoption level	1.12NS
4.	Experience in mango cultivation and Adoption level	11.49**
5.	Annual income and Adoption level	14.40**
6.	Yield of mango and Adoption level	11.61**
7.	Scientific orientation and Adoption level	13.63**
8.	Market orientation and Adoption level	11.86**
9.	Innovativeness and Adoption level	21.15**
10.	Information seeking behaviour and Adoption level	9.50**
11.	Knowledge about ill effects of pesticides and, chemical fertilizers and Adoption level	29.44**

NS - Non Significance ** 1.00 per cent level of significance

concluded that education of mango growers play a significant role in adoption of eco-friendly management practices. The findings are in line with the findings of Singh (2010) who found education of respondents associated with eco-friendly management practices of mango.

In case of area under mango Table 1 shows that calculated chi-square value (1.12) was less than the tabulated value at 4 degrees of freedom and 5 per cent of significance. This shows that area under mango and adoption of eco-friendly management practices of mango are not associated. Hence, it can be concluded that area under mango does not affect the adoption of eco-friendly management practices. The findings are somewhat in line with the findings of Kesarkar (2010) who found that area under cashewnut was negatively non-significantly associated with adoption level of organic practices of cashewnut.

Further analysis of data in Table 1 show that calculated chi-square value (11.49) was greater than the tabulated value at 4 degrees of freedom and 1 per cent of significance. This shows that there was significant association between experience in mango cultivation and adoption of eco-friendly management practices of mango. Hence, it can be inferred that is concluded that experience of mango cultivation contributes to the adoption of eco-friendly management practices positively. The findings are in line with findings of Sonawane *et al*. (2008-09) who noticed that experience in farming had positive and significant association with adoption of improved strawberry production technology.

It is further revealed from table that calculated chi-square value (14.40) was greater than the tabulated value at 4 degrees of freedom and 1 per cent of significance. This shows that there was significant association between annual income and adoption of eco-friendly management practices of mango. The results seem obvious. The orchardists of the study area realize the benefits of economic returns from mango and moderated the benefits of eco-friendly management practices in yield of mango. This might have attracted towards its application in the orchard. The findings are in line with findings of Anony (2005) who found that only annual income was found to have positively and highly significant influence on the adoption of recommended mango cultivation practices.

It can be observed from Table 1 that calculated chi-square value (11.61) was greater than the tabulated value at 4 degrees of freedom and 1 per cent of significance. This shows that there was significant association between yield of mango and adoption of eco-friendly management practices of mango. Hence, it is concluded that yield of mango definitely has an influence on the adoption of eco-friendly management practices. The findings are somewhat in line with findings of Kesarkar (2010) who found yield of cashewnut was significant but negatively associated with adoption of organic practices of cashewnut.

Further analysis of the Table 1 reveals that the calculated chi-square value (13.63) was higher than its tabulated value at 1 per cent level of significance and 4 degree of freedom. This indicates that there is an association between scientific orientation of the mango growers and adoption of eco-friendly management practices. It is unanimously accepted fact that a person with better exposure and scientific attitude is more innovative and prone to adopt the practices which give him more benefit. The same is reflected in the study results where an association between scientific orientation and adoption of eco-friendly management practices is observed. The present findings are in line with the findings of Singh (2010) who reported that scientific orientation of respondents was significantly correlated with the extent of adoption of improved mango cultivation.

Further analysis of Table 1 shows that the calculated chi-square value (11.86) is more than its tabulated value at 1 per cent level of significance and 4 degrees of freedom. This reveals that there is statistically significant association between market orientation and adoption of eco-friendly management practices of mango. This may be due to fact that mango growers are fully alert about market and it leads to more adoption of eco-friendly

management practices of mango. The results are dissimilar with the findings of Kesarkar (2010) who found that market orientation had non-significant relationship with adoption of organic practices of cashew. This finding is similar with findings of Kadam (2009) who found that market orientation is significant with adoption of commercial mango production technology.

The analysis of Table 1 in case of innovativeness shows that the calculated chi-square value (21.15) is greater than its tabulated value of 1 per cent level of significance and 4 degrees of freedom. This reveals that there is an association between innovativeness and adoption of eco-friendly management practices of mango. The findings are somewhat in line with the findings of Kadam (2006) who found that there is significant influence of change proneness i.e. innovativeness on adoption of commercial mango technology.

The Table 1 shows that the calculated chi-square value (9.50) is greater than its tabulated value of 1 per cent level of significance and 4 degrees of freedom. This reveals that information seeking behaviour and adoption of eco-friendly management practices are associated. Information seeking behaviour plays an important role in adoption of eco-friendly management practices of mango. If orchardists avail more sources and channels of agricultural information and seek information more frequently. They are is likely to be motivated towards adoption of eco-friendly management practices. Such results were not unexpected. The findings are somewhat in line with the findings of Kadam (2006) who found that there is significant influence of information utilization pattern on adoption of commercial mango technology.

The analysis of Table 1 shows that the calculated chi-square value (29.44) is greater than its tabulated value of 1 per cent level of significance and 4 degrees of freedom. This reveals that there is association between knowledge level about ill effects of pesticides & chemical fertilizers and adoption of eco-friendly management practices of mango.

CONCLUSION

It was concluded that personal, socio-economic, psychological, communication variables of the respondents *viz.*, education, experience in mango, annual income, yield of mango, scientific orientation, market orientation, innovativeness, information seeking behaviour and knowledge level of ill effects of pesticides and chemical fertilizers were significantly associated with adoption of eco-friendly management practices. On the other hand variables like age and area under mango were not significantly associated with adoption of eco-friendly management practices of mango. Therefore, the scientists, policy makers and administrator should consider them while formulating approaches, strategies and methodology for increasing adoption level of eco-friendly practices for sustainable production.

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GROWTH AND INSTABILITY OF FOREST IN RAJASTHAN: A TEMPORAL ANALYSIS

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ABSTRACT

Present study was carried out to understand the changes in Rajasthan's forests over time. The objective was to look at the changes in forest area. Coefficient of variation, Cuddy Della Valle Index and tabular analysis and were used to analyse the data. The study was conducted from 1995 to 2019 based on secondary data from published sources. The findings of the study revealed that compound growth rate was negative and significant for unclassified forest area (-5.10%) while positively significant for total forest (0.30%), reserved forest (0.90%) and protected forest area (0.80%). The instability was found to be maximum (8.57%) for unclassified forest than other forest area categories. Forest department should undertake agroforestry in unclassified forest area with the help of forest fringe villagers through joint forest management (JFM) to increase forest cover as well as production and revenue while keeping a watch so that forest area do not suffer from over exploitation.

INTRODUCTION

Rajasthan is currently India's largest state, accounting for 10.40 per cent of the country's geographical area. Rajasthan has a forest area of around 32,863 km2 (ISFR, 2021). This forest area accounts for 9.60 per cent of the state's geographical area and 4.24 per cent of India's forest area. Rajasthan ranks 15th in India in terms of documented forest area (State of Forest Report, FSI, 2019). The reserve forest, protected forest, and unclassified forest each cover 12,176 km2, 18,543 km2, and 2,144 km2 of land, respectively. The state's total forest cover is 16,654.96 km2, accounting for 4.87 percent (less than the recommended 20 per cent, according to Rajasthan Forest Policy, 2010) of total geographical area. Forest cover is further divided into three categories - dense forest cover, moderate forest cover and open forest cover, covering 78.15 km2, 4,368.65 km2 and 12,208.16 km2 area, respectively (ISFR, 2021). The state's forests support the diverse requirements of local people living in and around forest regions for timber, small timber, fuel, fodder, and other Non-Timber Forest Produce (Annual Report, Forest Department of Rajasthan, 2021). Forests provide a variety of ecological services to human civilization that are difficult to quantify in monetary terms, in addition to these physical products. Rajasthan's forests are also rich in wildlife, with a huge diversity of prey and predator animals. As a result of the rich biodiversity, a great number of visitors visit. With a great number of heritage structures, the state's protected areas have become attractive tourist destinations. This generates employment and income for people in the state.

After considering above points, the study entitled "Growth and Instability of Forest in Rajasthan: A Temporal Analysis" was framed with the specific objective.

MATERIALS AND METHODS

For any scholar, designing the research work systematically and planning it precisely is obligatory to resolve a specific research problem. This chapter

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deals with the various aspects like the selection of study area, various sources from which data have been collected and types of analytical tools are employed.

1. Selection of Study Area

Rajasthan state have been purposively selected for the present study. The state's geographical boundaries are 23°4'N to 30°11'N latitude and 69°29'E to 78°17' E longitude. The forest area of Rajasthan is 9.60 per cent of its geographical area. Rajasthan ranks 15th in terms of recorded forest area in India (State of Forest Report, FSI, 2019). The study period for the present study was considered from year 1995-96 to 2018-19 for the analysis of growth and instability of forest area. The research work was solemnly based on secondary data. The data was collected from various authentic and published sources such as State of Forest Reports, Forest Survey of India, Dehradun, 1995 to 2021, Statistical abstract Rajasthan, Directorate of Economics and Statistics, Rajasthan, 1995 to 2012 and 2015 and Agricultural Statistics of Rajasthan, Directorate of Economics and Statistics, Government of Rajasthan, 2015-16 to 2019-20.

2. Analytical tools

Growth analysis of forest area: The compound annual growth rate (CAGR) of forest area was calculated by fitting the following exponential function of the following formula:

$$Y_t = AB_t$$

The above equation was estimated after logarithmic transformation of as follow:

$$\text{Log } Y_t = \log A + t \log B$$

Then, the compound growth rate (per cent per year)

$$G = [(\text{Antilog } B) - 1] \times 100$$

Where, Y_t = area of reserved forests, protected forests and unclassified forests in period t (dependent variable)

A = intercept/constant

B = regression coefficient

G = compound growth rate

t = number of years.

To test the significance of estimated coefficients, 't' test was be used

$$\text{Calculate } 't' = \frac{\hat{b}}{Se\left(\hat{b}\right)}$$

Where,

$\hat{b}$ = Estimated coefficient of the model

= Standard error associated with coefficient

Measurement of instability in forest area

Deviation from the trend was measured by coefficient of variation for selected area and Cuddy-Della-Valle Index.

$$CV = SD \div AM \times 100$$

CV= Coefficient of variation (%)

SD=Standard deviation

AM= Arithmetic mean

The instability index of Cuddy-Della Valle index was given by the following expression;

Where,

CV=Coefficient of variation (per cent)

RESULTS AND DISCUSSION

The results of the present study are the contents of this section. The outcomes of this study are based on secondary data collected from published sources. In order to meet the prespecified objective, the data were tabulated, processed analysed and interpreted. This section covers the presentation and interpretation of the study's findings.

1. Growth and instability of forest area in Rajasthan

An insight into the growth or declining trends in

the area under forest provides the basic understanding of changes occurring in forests. The growth in forest is primarily affected by the area on which the flora is present. The degree of instability in recorded forest area (RFA) indicated the level of fragility in forests. The growth in forest area was computed by using compound growth rate formula, and instability was measured by coefficient of variation and Cuddy Della Valle Index (CDVI) through analysing the data.

Growth of forest area in Rajasthan: On the basis of legal status, the government has classified the forest area into three types viz. reserved forest, protected forest and unclassified forest. Table 1 shows the year wise growth of forest area. Area of reserved forest was 11585 km2 in year 1995 which increased up to 12476.07 km2 in year 2017 and slightly decreased to 12475 km2 in year 2019. Protected forest area grew from 16837 km2 in year 1995 to 18217 km2 in year 2019. Unclassified forest area remains fluctuating, however, saw a net decrease in forest area from 3278 km2 in year 1995 to 2045 km2 in year 2019. The total forest area had increased to 32737 km2 in year 2019 from 31700 km2 in year 1995.

Table 2 shows the compound growth rate of all forest categories. Analysis of data reveal that reserved forest area was significantly increased at the rate of 0.90 per cent per annum. The protected forest area was also significantly growing at the compound rate of 0.80 per cent per annum. However, a decline was observed in the growth of unclassified forest area in Rajasthan. It was significantly decreased with the rate of 5.10 per cent per annum. Despite this, the total forest area of Rajasthan had significantly increased at the rate of 0.30 per cent annually. The decline in unclassified forest may be attributed to agricultural land expansion, encroachment and other non-agricultural developmental projects while increasing number of conservation reserves, wildlife sanctuaries, national park and tiger reserves might be reason for a positive growth of the reserved and protected forest area in Rajasthan.

District wise growth in Forest Area of Rajasthan: 33 districts of Rajasthan having a wide variety of geographical features. Table 3 depicts the district wise growth rates of Rajasthan. A positive and significant growth in forest area was noticed in Hanumangarh district (1.79%) followed by

Table 1: Recorded Forest Area (RFA) of various forest categories

Year	Reserved Forest area (Sq.km)	Protected Forest area (Sq.km)	Unclassified Forest area (Sq.km)	Total Forest area (Sq.km)
1995	11585.00	16837.00	3278.00	31700.00
1997	11585.00	16837.00	3278.00	31700.00
1999	11585.00	16837.00	3278.00	31700.00
2001	11860.00	17658.00	2976.00	32494.00
2003	11860.00	17652.00	2976.00	32488.00
2005	12020.56	17218.26	3248.80	32487.06
2009	12455.04	17416.17	2767.78	32638.99
2011	12455.04	17416.17	2767.78	32638.99
2013	12475.00	18217.00	2045.00	32737.00
2015	12475.00	18217.00	2045.00	32737.00
2017	12476.07	18214.86	2046.06	32736.99
2019	12475.00	18217.00	2045.00	32737.00

Source: State of Forest Reports, FSI, 1995 to 2019

Jaisalmer (1.12%), Alwar (0.79%) and Bikaner (0.64%). Negative and significant growth in forest area was observed in Chittorgarh (-1.17%), Sawai Madhopur (-0.95%), Banswara (-0.45%), Churu (-0.14%) and Pratapgarh district (-0.002%). The maximum growth in forest area was found in the districts located in western Rajasthan which is mainly part of Thar desert. Whereas decline in forest area was noticed in southern and south eastern districts located in hilly regions of Aravalli ranges. Similar results in growth of forest area were obtained in studies conducted by Ram (2009) reported increment in forests in arid regions of Rajasthan. Meena et al. (2021), Newar and Sharma (2018) and Thanuja et al. (2021) also reported similar increasing growth in forest areas of Rajasthan.

Table 2: Compound Growth Rates of forest area during year 1995 to year 2019

Forest Categories	CAGR (%)
Reserved Forest Area	0.90*
Protected Forest Area	0.80*
Unclassified Forest Area	-5.10*
Total Forest Area	**0.30***

*Significant at 1 per cent level of significance

Instability in forest area of Rajasthan: Instability analysis is one of the most significant decision tools for accessing the level of uncertainty in forest area which may impact the growth of flora and fauna, and may cause imbalance in ecological equilibrium. The Cuddy Della Valle Instability Index, which takes into account Coefficient of Variation and Adjusted R^2, was used to analyse the instability in different forest categories of Rajasthan during the study period i.e., 1995 to 2019.

Table 4 represents values of coefficient of variation and Cuddy Della Valle Index of forest categories. The results indicated that variability in terms of coefficient of variation was highest for unclassified forest area (19.67%) followed by reserved forest area (3.28%), protected forest area (3.20%) and total forest area (1.34%). CDVI values were maximum for unclassified forest area (8.57%) followed by protected forest area (1.55%), reserved forest area (1.24%) and total forest area (0.70%). By these findings it is clear that unclassified forest area was more instable than other categories of forest area while total forest area was least instable. The trend in instability in forest area was similar in

Table 3: District wise growth in Forest Area of Rajasthan during year 1995 to year 2019

Districts	CAGR (%)
Ajmer	0.36*
Alwar	0.79*
Banswara	-0.45*
Baran	0.07*
Barmer	0.55*
Bharatpur	0.50*
Bhilwara	0.21*
Bikaner	0.64*
Bundi	0.06*
Chittorgarh	-1.17*
Churu	-0.14*
Dausa	0.32*
Dholpur	0.22*
Dungarpur	0.13*
Ganganagar	0.14*
Hanumangarh	1.79*
Jaipur	0.24*
Jaisalmer	1.13
Jalore	0.56
Jhalawar	0.18*
Jhunjunu	0.03*
Jodhpur	0.42*
Karauli**	0.07*
Kota	0.14*
Nagaur	0.34*
Pali	0.24*
Pratapgarh**	-0.002*
Rajsamand	0.25*
Sawai Madhopur	-0.95*
Sikar	0.05*
Sirohi	0.05*
Tonk	0.20*
Udaipur	0.003*

*Significant at 1 % level of confidence; ** Growth Rates for Karauli and Pratapgarh are calculated from 1997-98 and 2008-09, respectively from the year of their formation.

case of both the measurement approaches of instability i.e., CV and CDVI.

Table 4: Instability in forest area by Coefficient of Variation and Cuddy Della Valle Index

Forest Categories	CV (%)	Cuddy Della Valle Index (%)
1.Reserved Forest Area	3.28	1.24
2.Protected Forest Area	3.20	1.55
3.Unclassified Forest Area	19.67	8.57
4.Total Forest Area	1.34	0.70

District wise instability in forest area of Rajasthan: Table 5 depicts the instability in forest area of districts in terms of coefficient of variation and Cuddy Della Valle Index. The results propounded that variability in terms of coefficient of variation was highest for Sawai Madhopur district (53.84%) followed by Jaisalmer (31.1%), Hanumangarh (28.86%), Chittorgarh (21.93%) and Alwar (15.36%). Whereas lowest variability was recorded in Pratapgarh (0.07%) followed by Jhunjhunu (0.54%), Sirohi (0.96%), Sikar (1.05%) and Bundi (1.29%). The results revealed that instability in terms of CDVI was highest for Sawai Madhopur (46.55%) followed by Jaisalmer (27.41%), Hanumangarh (14.87%) and Chittorgarh (13.81%) while lowest instability was found in the Pratapgarh district (0.08%) followed by Jhunjhunu (0.22%), Sirohi (0.52%), Baran (0.63%) and Sikar (0.68%). It was observed that more instability was observed in southern hilly districts (Chittorgarh, Banswara) of Aravalli ranges and western districts (Jaisalmer, Jodhpur) of desert area while low instability was observed in eastern and south-eastern districts (Kota, Baran, Bundi, Karauli) of plateau region. These results are in alignment with the study conducted by Thanuja et al. (2021).

Table 6 indicate the frequency distribution of instabilities among the different districts of Rajasthan in terms of CDVI values. When CDVI value ranged from 0 to 15 indicated low instability, medium range instability lies more than 15 and less than 30 whereas high instability ranges more than 30 CDVI values. Out of 33 districts, only 1 district has high instability i.e., Sawai Madhopur. 1 district fall in medium range instability i.e., Jaisalmer while rest 31 districts falls in low instability range.

CONCLUSIONS

The growth rate of unclassified forest area (-

Table 5: District wise instability in forest area of Rajasthan

Districts	CV (%)	CDVI (%)
Ajmer	6.30	2.61
Alwar	15.36	8.21
Banswara	9.65	7.27
Baran	1.30	0.63
Barmer	10.24	4.64
Bharatpur	8.94	3.54
Bhilwara	5.48	3.92
Bikaner	10.97	2.84
Bundi	1.29	0.82
Chittorgarh	21.93	13.81
Churu	6.23	5.98
Dausa	5.52	1.54
Dholpur	6.76	5.16
Dungarpur	2.43	0.91
Ganganagar	2.94	1.79
Hanumangarh	28.86	14.87
Jaipur	5.62	3.58
Jaisalmer	31.10	27.41
Jalore	8.99	2.76
Jhalawar	3.22	0.91
Jhunjunun	0.54	0.22
Jodhpur	11.12	7.83
Karauli**	1.48	0.96
Kota	2.58	0.77
Nagaur	7.99	4.92
Pali	4.13	1.49
Pratapgarh**	0.07	0.08
Rajsamand	4.36	1.40
Sawai Madhopur	53.84	46.55
Sikar	1.05	0.68
Sirohi	0.96	0.52
Tonk	4.32	2.43
Udaipur	2.54	2.58

** CV and CDVI for Karauli and Pratapgarh are calculated from 1997-98 and 2008-09, respectively from the year of their formation.

Table 6: Frequency distribution of instability in forest area based on CDVI

Instability in CDVI values	Frequency of Districts	Percentage
Low (less than 15)	31	93.94
Medium (>15 - 30)	1	3.03
High (more than 30)	1	3.03
Total	**33**	**100.00**

5.10%) was found to be negative and significant while it was observed to be positive and significant for reserved forest (0.90%), protected forest (0.80%) and total forest area (0.30%). The decline in unclassified forest can be attributed to agricultural expansion, encroachment and other non-agricultural developmental projects. Compound growth rate in forest area was significant and maximum for Hanumangarh (1.79%), Jaisalmer (1.12%) and Alwar (0.79%) while it was significant and minimum Chittorgarh (1.17%), Sawai Madhopur (0.95%) and Banswara (0.45%) districts. Instability in terms of coefficient of variation was highest for unclassified forest (19.67%) followed by reserved forest (3.28%), protected forest (3.20%) and total forest (1.34%) whereas in terms of CDVI it was highest for unclassified forest (8.57%), protected forest (1.55%), reserved forest (1.24%) and total forest (0.70%). The instability in terms of coefficient of variation was maximum for Sawai Madhopur district that is 53.84 per cent followed by Jaisalmer (31.1%), Hanumangarh (28.86%), Chittorgarh (21.93%) and Alwar (15.36%). A similar pattern of instability was observed in same districts through CDVI. The unclassified forest was found to be more instable than other forest area categories because of more human intervention in these areas which led to its encroachment and exploitation. The growth analysis suggests that unclassified forest area was decreasing year after year. Hence, government should take serious measures for restricting the destruction of vegetation and remove encroachments timely. Forest department should undertake agroforestry in unclassified forest areas with the help of forest fringe villagers through joint forest management (JFM) to increase the forest cover as well as production and revenue from various forest produce while keeping a watch so that forest area do not suffer from over exploitation.

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STUDY OF THE HORTICULTURE GROWERS BENEFITED UNDER NAIP PROJECT

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ABSTRACT

The present study was conducted in tribal dominated district of southern Rajasthan. Total 28 villages were selected from 10 clusters of Udaipur, Dungarpur, Banswara and Sirohi districts of the state. For the selection of respondents total 288 beneficiary farmers were selected randomly. The results of the study revealed that area covered under Horticultural crops could exert desirable influence on the beneficiaries of tribal area farmers of horticulture based IFS. Further, it was noted that various agencies helped the beneficiaries for getting the benefits of the project in the study area.

INTODUCTION

The NAIP is aimed at generation and integration of innovative approaches and their applications to improve the food grain, food productivity and employment generation in the country. Implementation of the project was expected to provide valuable opportunity of scaling up of the technologies addressing the issues involved in livelihood and nutritional security.

Since the available farm land in India is limited, feeding of ever increasing population can only be possible by increasing yield. In addition, about 70 per cent of India's population still depends on agriculture for living. Livelihood, food and nutritional security are the concern of the day. Therefore, it is essential to apply modern scientific methods in a major way to improve agriculture. Towards this goal, the Indian council of Agricultural Research launched a new initiative named as "National Agricultural Innovation Project (NAIP)" with financial assistance from the World Bank. The overall objective of NAIP is to facilitate an accelerated and sustainable transformation of Indian agriculture, so that it can support poverty alleviation and income generation through collaboration, development and application of agricultural innovations by the public organizations, in partnership with the farmers, the private sectors and other stakeholders.

Attaining livelihood and nutritional security, improved quality of life and sustainability of agriculture is an important goal for the governments. The productivity and profitability of the tribal regions in the country has not improved. It is worth mentioning that four districts of Rajasthan *viz*. Udaipur, Banswara, Dungarpur and Sirohi figure prominently as the disadvantaged districts identified by the planning commission based on income, tribal population, their resources and state of agriculture, etc. Food self sufficiency still eludes the major segment of the population in this region. This has led to growing disparity in the standard of living and social inequity. The agriculture in this region is the main stay of the people, yet it is at a subsistence level because of low productivity and income.

Despite low production and productivity, the farmers have resorted to suicide in progressive states like Karnataka, Maharastra, Andhra Pradesh and Hariyana because their limited wants are not met, that leads to poverty in their strides. They deserve to have better quality of life. Recurring droughts is another dilemma faced by farmers, especially in Dungarpur, Sirohi and Udaipur district. Because of poor extension and primitive agricultural practices, there are spectacular evidences of very low productivity.

With the technology options available, it is possible to have growth oriented livelihood with

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enhanced productivity of small and marginal farmers in the region. Government of India, realizing the fate of the farmers with poor resources base and low risk bearing capacity in the disadvantaged districts, executed a number of schemes for creating livelihood opportunities under Tribal Area Development (TAD) programmes like National Rural Employment Guarantee Act (NAREGA) and Integrated Village Development Programme (IVDP). Under NATP, Integrated Farming System (IFS) models were tested on limited scale.

It led to increase income and profitability. However, in that model, few technologies were there. Unless a basket of proven, regionally appropriate technologies are taken in an integrated and holistic manner, major benefits cannot be achieved.

In the consortia project of NAIP under MPUAT, Udaipur, two models. (i) Horticulture based IFS and (ii) livestock based IFS model with judicious mix of proven need assessed technologies, appropriate for small and marginal farmers encompassing end to end approach were planned for development of appropriate replicable models. The public private partnership in a consortia mode was expected to accelerate the pace of sustainable development and increasing productivity. Cluster approach in a specific sites differing in natural resource base in four identified district was chosen. Appropriate, sound and effective baskets of technologies aimed at propelling agricultural transformation leading to increase in farm employment, increased productivity and profitability. Better management of natural resources, processing and value addition and federating farmers for marketing of their produce were the another strategies for research. The strategies developed drawn heavily on the past proven technologies, testing them in integrated and holistic manner and having multiple technology options for increased income leading to better quality of life to families in the clusters identified for creating sustainability fund through farmers' contribution, which will take care of post project sustainability.

A number of innovations were built in the design to ensure success of sustainable livelihood and nutritional security. Creation of rural technology centres in each cluster aimed at reducing knowledge gap, technological empowerment and entrepreneurship development. Another innovation was the establishment of farmers' business groups and Producers' Companies to empower producers by making them active entrepreneurs- cum-primary stakeholders in the process of development.

Integrated farming system approach provides food security, balanced food, quality food basket, enhanced farm income, higher employment generation, social upliftment, effective recycling of resources, sustainable soil health, reduced risk and minimum environmental pollution.

Under the NATP, integrated farming system modules were tested on limited scale and essentially taken up for testing only, a few technology options without taking into account the resources base as well as multiple options from basket of technologies suited to small and marginal farmers. Many of the ICAR institutes and SAU's have developed technologies, which individually lead to improvement in crops or animal productivity. The concept "development" during NATP was very sound but technologies were disseminated to individual farm families.

Considering the short comings of NATP, the enthusiastic new initiative has been made in the country in the name of NAIP. Many of the SAU's have been entrusted to take up consortia project related to NAIP for food and nutritional security. Maharana Pratap University of Agriculture and Technology, Udaipur was also sanctioned a consortia project titled "livelihood and nutritional security of tribal dominated areas through integrated farming system and technology models" with worth Rupees 18.38 crores. This consortia project consisted of two types of IFS's (i) Horticulture based IFS and (ii) Livestock based IFS. As per the knowledge and information to the researcher, no empirical study so far has been conducted by any other researcher to evaluate the project in relation to Horticulture based IFS.

RESEARCH METHODOLOGY

The present study was undertaken the project implemented by MPUAT, in Udaipur, Durgapur, Banswara and Sirohi district of Rajasthan. District and clusters were selected purposely due to working area in the state. From the selected clusters, 10 clusters, where NAIP was implemented. From the selected villages, there were 78 villages, in which the NAIP was executed, out of these, 28 were the sampled villages for conducting the Mid-term evaluation. Therefore, purposively, these 28 villages were considered as selected for the present study. A sample 130200 Beneficiaries were covered under NAIP in 78 villages of 10 clusters. But sampled respondents for mid-term evolution of consortia NAIP were as many as 66 each from 10 clusters (total 660). The sampled respondents did vary from village to village so selected for evolution of the consortia project. Out of these 660 total sampled respondents of consortia project, total 288 beneficiaries were sampled for the present investigation. Thereafter, collected data were analyzed, tabulated and interpreted in the light of above objective. The SPSS 13.0 version software was used for statistical analysis of data.

RESULTS AND DISCUSSION

Classification of NAIP beneficiaries according to area covered under Horticultural crops

The present investigation is on the evaluation of NAIP for transformation of tribal area farmers through Horticulture based IFS. One of the parameters of respondents' profile was the area (ha) under horticultural crops in the study area of four districts of Rajasthan state.

The area under vegetables and the fruits was observed for the period of implementation of NAIP in the investigation area and the findings have been presented in Table 1. The results of table visualized that the area under vegetables (<1ha and 1-2 ha) was more in Udaipur district followed by Dungarpur, Banswara and Sirohi. As the area under fruits was concerned, very few farmers of Udaipur district were observed utilizing their land for fruits cultivation followed by Sirohi, Banswara and Dungarpur. It is evident clearly from the table that fruits cultivation in the study area could not be encouraged due to NAIP interventions. The farmers of Banswara and Sirohi district belonging to 1-2 ha of land and 1 ha of land were less inclined towards the cultivation of various vegetable crops.

In line with the findings, it is inferred that cultivation of fruits in the study area could not be popularized among the tribal area farmers with satisfaction. Similarly, vegetable cultivation in Banswara and Sirohi could not be persuaded by the NAIP among small farmers as expected. Thus, it can be concluded that very little transformation had been observed among the tribal area farmers through Horticulture based IFS. Thus, the livelihood and nutritional security is still under threat and in dangerous situation in the tribal area of Rajasthan state were the present study was conducted

In accordance with the findings, it is strongly suggested and recommended that the vegetables and fruits cultivation in the study area among small, marginal and big farmers is to be emphasized, the farmers must be trained, motivated and all possible efforts, and right from beginning to the value addition must be channelized under the projects similar to NAIP. It is also recommended that the NAIP consortia project at MPUAT must introspect and must go for reconsideration and put more efforts towards fruits and vegetable cultivation in the study area, which would definitely lead towards the livelihood and nutritional security of tribal area people, then and their actual transformation through Horticulture based IFS under NAIP could be justified.

The NAIP could not be fully successful in increasing the area under horticultural crops in its operational area of Udaipur, Sirohi, Dungarpur and Banswara. The regions may be undulating land holdings, fragmented land holdings and scarcity of irrigation water etc.

Agencies helped to the beneficiaries during execution of NAIP

During the implementation of NAIP various

Table 1: Classification of NAIP beneficiaries according to area covered under Horticultural crops

n=288

District	Vegetables category			Total	Fruits category			Total
	<1 f	1-2 f	>2 f		<1 f	1-2 f	>2 f	
Udaipur	90(78.26) 41.67*	24(20.87) 40.68*	1(0.87) 16.67*	115(100.00) 39.93*	36(100.00) 52.94*	0	0	36(100.00) 52.94*
Sirohi	38(69.09) 17.59*	14(25.45) 23.73*	3(5.45) 50.00*	55(100.00) 19.10*	15(100.00) 22.06*	0	0	15(100.00) 22.06*
Dungarpur	45(66.18) 20.83*	21(30.88) 35.59*	2(2.94) 33.33*	68(100.00) 23.61*	11(100.00) 16.18*	0	0	11(100.00) 16.18*
Banswara	43(86.00) 19.91*	7(14.00) 11.86*	0(0.00) 0.00*	50(100.00) 17.36*	6(100.00) 8.82*	0	0	6(100.00) 8.82*
Total	216(75.00) 100.00*	59(20.49) 100.00*	6(2.08) 100.00*	288(100.00) 100.00*	68(100.00) 100.00*	0.00	0.00	68(100.00) 100.00*

f= frequency, %= Percentage, n= Total number of respondents, *= Percentage to columns, Figures in the parentheses show percentage of rows

Table 2: Classification of beneficiary farmers based on the help they received during implementation of the project

n=288

Agencies	Udaipur f	Sirohi f	Dungarpur f	Banswara f	Total f
SRFs	109(37.85) 32.83*	51(17.71) 34.23*	62(21.53) 32.46*	46(15.97) 34.59*	288(100.00) 33.33*
Village workers	111(38.54) 33.43*	48(16.67) 32.21*	64(22.22) 33.51*	43(14.93) 32.33*	288(100.00) 33.33*
Cluster village committees	112(38.89) 33.73*	50(17.36) 33.56*	65(22.57) 34.03*	44(15.28) 33.08*	288(100.00) 33.33*
Total	332(38.43) 100.00*	149(17.25) 100.00*	191(22.11) 100.00*	133(15.39) 100.00*	864(100.00) 100.00*

f= frequency, %= Percentage, n= Total number of respondents, *= Percentage to columns, Figures in the parentheses show percentage of rows

agencies might have helped the beneficiaries for getting the benefits of the project. Three agencies were defined by the NAIP consortia project MPUAT, Udaipur, that might have helped the farmers; these were SRFs, Village workers and cluster village committees. The results of help rendered by these agencies have been presented in Table 2.

Data revel that the beneficiary of the district Udaipur 109 (37.85 per cent), 111(38.54 per cent) and 112 (38.89 per cent) were benefited through SRFs, village workers and cluster village committees, respectively. Next in the order were the beneficiaries of district Dungarpur, who opined that they got help from cluster village committees, village workers and SRFs, respectively with their respective per cent of 22.57, 22.22 and 21.53. The beneficiaries of Sirohi were also considerably assisted and helped by the SRFs, village workers and Cluster village committees for obtaining the benefits of NAIP. It is also apparent that the farmers of Banswara did not get much help from the defined agencies.

CONCLUSION

Based on the findings, it is concluded that the NAIP beneficiaries of the Udaipur district were highly helped by SRFs followed by Cluster village committees constituted by the NAIP consortia project and village workers followed by the beneficiaries of district Dungarpur. Beneficiaries of Banswara and Sirohi were observed in lesser number for these sorts of help from these agencies. Hence it is inferred that as per expectations, the SRFs, Cluster village committees and village workers duly helped and co-operated the beneficiaries during the NAIP. It is obvious that the NAIP exerted definite positive impact in terms of providing the help to the farmers in favour of their transformation through Horticulture based IFS under NAIP.

It is recommended that the SRFs at grassroots level, village workers and cluster village committees which were employed by the present NAIP Model of the study area must be followed by similar sort of innovative projects related to livelihood and nutritional security of the beneficiaries.

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ECONOMIC FEASIBILITY OF IMPROVED TECHNOLOGY IN CROP BASED MODULE UNDER FARMER FIRST PROGRAMME BY AGRICULTURE UNIVERSITY JODHPUR

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ABSTRACT

The study was conducted through crop based module in selected Villages under Farmer FIRST Programme in the crop year 2019-20. The study revealed that the green gram variety GAM-5 recorded higher yield increase (36.7%) in seed yield over local crop. Pearl Millet hybrid MPMH-17 recorded average net return of Rs. 48,700/-ha with B:C ratio of 3.26 as against net return of Rs.33,300/- ha obtained under local with B:C ratio of 2.85. The IPM technology in green gram increased seed yield by 18 per cent. Similarly Mustard variety NRCHB-101 was found superior over local cultivar as it gave average seed yield of 19 q/ha which was 30.8per cent higher over local variety and Wheat variety Raj-4083 was found suitable for timely sown in irrigated conditions and had high tolerance to higher temperature during ripening stage. Farmer got net income of Rs. 68,000/- with B: C ratio of 2.89 by the average seed yield of 35q/ha as against seed yield of 30q/ha under local variety.

INTRODUCTION

Rajasthan is the largest State in the country with a land area of 32 million hectares, which comprises 10.4% geographical area of the country. Approximately 70 per cent of the total population of the State is engaged directly or indirectly in agriculture. The State has only 1.16% of average surface water of the total water resources in the country. Pearl millet is the predominant crop of the zone followed by cluster bean and moth bean. Sesame and green gram are other important oilseed and pulse crops, respectively. Only 7 percent crop area is under irrigation. Cumin, Rapeseed, Mustard, Wheat and Isabgol are major crops grown in Rabi season. Arid western plan zone-I of Rajasthan State has cultivated area of 27 m ha which is 53% of the Geographical area.

The Agriculture University has jurisdiction area of Jodhpur, Barmer, Pali, Sirohi, Jalore and Nagaur districts of Rajasthan with great variability in soil, water along with rainfall ranging from 100 to 600 mm per year. In the jurisdiction of this University, Pearl Millet, Sesame, Fennel, Dill, Fenugreek, Castor, Green Gram, Moth Bean, Chili, Onion, Cumin, Isabgol, Henna, Senna, Ker, Kumat, Ashwagandha and Aloe vera predominantly belong to this region.

Concept of Farmer First and Technology Integration

The project proposal entitled "Technology Integration for Doubling Farm Income through Participatory Research and Extension Approaches in Jodhpur District of Rajasthan" under Farmer FIRST Programme (FFP) has been implementing in Jodhpur District of Rajasthan. The concept of technology integration was conceptualized that can be used in farm production system. It is a function which can only relate the research and technology development efforts to extension. In this function utmost importance has been given to farmer's need, resources and local environment. Farmer is treated as an active partner with the researchers both at the decision-making and implementation stages in technology assessment and refinements for

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generation and dissemination of appropriate technologies.

RESEARCH METHODOLOGY

The Project District: The project was implemented in Jodhpur District of Rajasthan. Eighty percent cultivable land is rain fed and 11% land is irrigated in the district. It receives rainfall of 300 mm/annum mostly in monsoon months. Precipitation is rather variable. There are, on an average 70 rainy days in a year and 75 days rainfall is below 2.5 mm. On 35 rainy days evaporation level is more than 2.5 mm per day. The climate ranges from dry arid to semi-arid. The vast list of plant species found in the district.

The Project Village: Three Villages namely of Manai, Binjwadia, Balarwa of Jodhpur district were selected comprising of 3137 households out of which selected 1000 households were covered under the project. The demographic details of the Project Villages are given in Table 1.

RESULTS AND DISCUSSION

Economics of technology demonstrated in crop based module under Farmer First Programme shows low yielding varieties of green gram is generally grown by the farmer of the adopted villages. Seed of improved variety GAM-5 was introduced at the 50 farmers of three adopted villages for raising crop in 0.4 ha area. This variety was found suitable for rain fed condition. Green gram variety GAM-5 recorded higher yield it increase (36.7 per cent) in seed yield over local crop. This variety also recorded average net return of Rs. 48,700/-ha with B: C ratio of 3.26 as against net return of Rs.33, 300/- ha obtained under local with B:C ratio of 2.85. Intervention of this variety provided aadditional net return of Rs. 15,400/-ha.

Similarly pearl millet hybrid MPMH-17 released by AU, Jodhpur was demonstrated at 50 Farmers field in the three adopted Villages. Yield data of demonstrations indicate that this hybrid was found better over the farmers grown varieties and local Pearl Millet and gave average seed yield of 16.5 q/ha. This hybrid gave net return of Rs. 26,200/-per hectare under rain fed condition in the fields. It was higher over local cultivar by 27 per cent. Pearl Millet hybrid MPMH-17 was found safe from bird damage & it was disease & pest free during the crop pendency. Similarly green gram is susceptible to pod borer and sucking pest. If the pest are not controlled

Table 1: Demographic details of selected villages

S. No.	Block	Villages	No. of Households	Population		
				Male	Female	Total
1.	Tinwari	Manai	594	1140	1182	2322
		Binjwadia	870	3109	2789	5891
		Balrwa	1673	4213	3181	7394
	Total		**3137**	**8462**	**7152**	**15607**

For analyzing the results percent increase, Net income and B:C ration were computed.

Table 2: Economics of technology demonstrated in crop based module under Farmer FIRST Programme

Name of Crop	Yield (kg/ha)		% increase	Net Return (Rs/ha)		Benefit-Cost Ratio	
	Local	Demo		Local	Demo.	Local	Demo.
Green Gram variety GAM-5	790	1080	36.7	33,300	48,700	2.85	3.26
Pearl Millet hybrid - MPMH-17	1300	1650	27.0	18,400	26,200	2.00	2.31
IPM in Green gram	900	1060	17.7	40,500	47,900	3.25	3.28
Mustard variety NRCHB-101	1600	1900	19.0	48,200	59,550	3.09	3.38
Wheat variety Raj-4083	3000	3500	16.7	55,000	68,000	2.61	2.89

timely, yield losses up to 30-40 % may occur. Application of IPM in green gram (foliar spray of quinolphos 1 L/ha followed by neem oil spray @ 2 lit/ha) resulted in avg. increase of seed yield by 18 per cent. IPM also recorded average net return of Rs. 47,900/-ha with B: C ratio of 3.28 as against net return of Rs.40, 500/- ha obtained under local pracctise of pest control with B:C ratio of 3.28. Similar results were reported by Patel et.al. (2009) and Kumawat (2008).

In case of mustard variety NRCHB-101was demonstrated to 30 farmers in three selected villages under Irrigated flatbed cultivation with small size of holding. This variety was found superior over local cultivar as it gave average seed yield of 19 q/ha which was 30.8per cent higher over local crop. The net returns were higher by Rs. 11,350/- ha compared to local crop. As far as low yielding varieties of wheat crop is grown by the farmer of the area. Seed of improved varieties Raj-4083 was demonstrated at the 50 farmer's, each 0.4 ha area in selected villages. Wheat variety Raj-4083 was suitable for timely sown & irrigated conditions and has high tolerance to higher temperature during ripening stage. Farmer got net income of Rs. 68,000/- with B: C ratio of 2.89 by the average seed yield of35q/ha as against seed yield of 30q/ha under local plots. The results are in consonance with Kumar (2019).

CONCLUSION

The study concluded that the green gram variety GAM-5 recorded very high, increase (36.7 per cent) in seed yield over local crop. Pearl Millet hybrid MPMH-17 recorded average net return of Rs. 48,700/-ha with B:C ratio of 3.26 as against net return of Rs.33,300/- ha obtained under local with B:C ratio of 2.85. IPM technology in green gram increased seed yield by 18 per cent. Similarly mustard variety NRCHB-101 was found superior over local cultivar as it gave average seed yield of 19 q/ha which was 30.8per cent higher over local variety and wheat variety Raj-4083 was found suitable for timely sown in irrigated conditions and had high tolerance to higher temperature during ripening stage. Farmer got net income of Rs. 68,000/- with B: C ratio of 2.89 by the average seed yield of35q/ha as against seed yield of 30q/ha under local variety.

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ASSESSMENT OF KNOWLEDGE OF FARMERS ABOUT PRADHAN MANTRI KRISHI SINCHAYEE YOJANA (PMKSY)

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ABSTRACT

The present study was undertaken in Pratapgarh district of Rajasthan. A sample size of 120 respondents from two tehsils (Pratapgarh & Chhoti Sadri) was selected on the basis of random sampling technique. The study was conducted to identify the knowledge perceived by beneficiary and non-beneficiary respondents about Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) in Pratapgarh district of Rajasthan. The study indicated that majority of respondents fell in medium level of knowledge towards Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). Beneficiary and non-beneficiary respondents of PMKSY in Pratapgarh and Chhoti sadri tehsils possessed the maximum knowledge about the aspects like "Progressive farmer provides the knowledge about PMKSY" and "PMKSY reduce the dependency of rain water for irrigation". These aspects were ranked first and second by beneficiary and non-beneficiary respondents.

INTRODUCTION

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) is a national mission to improve farm productivity and ensure better utilization of resources in the country. The Ministry of Agriculture and Farmers Welfare and Government of India has launched the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) to address India's key agricultural challenges in the 21st century i.e., to reduce poverty and ensure food security for the growing population in the face of climate change, scarce of limited water and land resources. This initiative proposes to provide irrigation to every farm in the country (Har Khet Ko Pani) and improve water use efficiency through Per Drop More Crop. It aims to bring together various schemes and programmes for water harvesting, conservation and efficient management in order to ensure there is enough water for agriculture. This programme also aims to harness the potential of agriculture by effectively utilizing green (soil moisture) and blue water (irrigation) for improving efficiency, sustainability, equity and resilience at the farm level for rain-fed, marginal and fragile areas.

RESEARCH METHODOLOGY

The present study was conducted in Pratapgarh district of Rajasthan. The selected study area fells under the jurisdiction of MPUAT, Udaipur. The selected district consists of five tehsils, out of which two tehsils, namely Pratapgarh and Chhoti sadri were selected with maximum number of beneficiary respondents of PMKSY. A comprehensive list of respondents was prepared with the help of Assistant Director of Horticulture Pratapgarh. Out of list 30 beneficiary and 30 non-beneficiary respondents were selected from each of tehsil on the basis of random sampling technique, thus a total 120 respondents were selected for present investigation. In order to achieve the defined objective of the study, a comprehensive interview schedule was developed. Data were collected from the respondents with the help of interview techniques. Analysis of the data was done with the help of different statistical tools like mean, frequency distribution, percentage, mean percent score (MPS) and standard deviation.

RESULTS AND DISCUSSION

Knowledge level of beneficiary respondents in

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Pratapgarh tehsil

Table 1 reveals that out of total 60 respondents, majority of respondents (63.34%) were found in medium level of knowledge group, whereas, 20.00 per cent respondents were observed in the low level of knowledge group and remaining 16.66 per cent respondents possessed high level of knowledge group about PMKSY in study area.

Analysis of Table 1 further reveals that 2 (6.66%) beneficiary respondents and 10 (33.34%) non-beneficiary respondents were observed in low level of knowledge group, while, 20 (66.67%) beneficiary and 18 (60.00%) non-beneficiary respondents were observed in medium level of knowledge group. About 8 (26.67%) beneficiary and 2 (6.66%) non-beneficiary respondents were observed in high level of knowledge group in the study area.

Jayasankar et al. (2020) in their study on drip irrigational technologies found that majority 55.00 per cent of the respondents had medium level of knowledge, 30.00 per cent high level of knowledge and 15.00 per cent of low level of knowledge about the recommended drip irrigation technology.

Aspect wise extent of knowledge of beneficiary respondents

It is evident from the data incorporated in Table 2 that "Progressive farmer provides the knowledge about PMKSY" was the most favoured knowledge statement expressed by majority of the respondents with MPS 90.00 and ranked first and "PMKSY reduce the dependency of rain ware for irrigation" was second important knowledge area perceived by respondents with MPS 85.00 and ranked second.

Table 2 further shows that respondents considered both statements that "Illiterate person can get benefit of PMKSY" and "We can change the cropping pattern because of PMKSY" as favoured knowledge statements with MPS 73.33 and ranked third. Likewise, "The minimum age for the availing this scheme is 18 years" was ranked fifth with MPS 65.00. Further, "PMKSY reduce inequality in distribution of farming family" with MPS 58.33 and ranked sixth. "PMKSY facilitated irrigation service to the beneficiary" knowledge aspect was ranked seventh with MPS 55.00.

Table further shows that knowledge aspect "PMKSY is helpful in reducing the spread of water scarcity in the country" with 53.33 MPS was ranked eighth by respondents, whereas, the knowledge area like "Agricultural University provided the knowledge about PMKSY" with MPS 51.67 and ranked ninth. "PMKSY to be used as a platform for Direct Benefits Transfer (DBT) for subsidies provided by Government under other schemes" and "Beneficiary can be benefitted in any sub-scheme of Drip Irrigation, Sprinkler Irrigation or other under PMKSY" both knowledge statements with MPS 50.00 and ranked tenth. Likewise, "PMKSY is the mission to take benefit for every farmer" with MPS 46.67 and ranked twelfth. "We can take benefit of PMKSY in any Agriculture department" with MPS 41.67 and ranked thirteenth, while, "SHG provided the knowledge about PMKSY" with MPS 40.00

Table 1: Distribution of beneficiary respondents according to their knowledge about PMKSY in Pratapgarh tehsil

n=60

S. No	Category	Beneficiary		Non-beneficiary		Total	
		f	%	f	%	f	%
1.	Low (<7.32)	2	6.66	10	33.34	12	20.00
2.	Medium (7.32 - 15.68)	20	66.67	18	60.00	38	63.34
3.	High (>15.68)	8	26.67	2	6.66	10	16.66
	Total	**30**	**100.00**	**30**	**100.00**	**60**	**100.00**

F = frequency, % = per cent

Table 2: Aspect wise knowledge of beneficiary respondents regarding PMKSY in Pratapgarh

n=60

S. No.	Statements	Beneficiary MPS	Non-beneficiary MPS	Total MPS	Overall Rank
1.	Progressive farmer provides the knowledge about PMKSY	93.33	86.67	90.00	I
2.	PMKSY reduce the dependency of rain water for irrigation	90.00	80.00	85.00	II
3.	Illiterate person can get benefit of PMKSY	70.00	76.67	73.33	III
4.	We can change the cropping pattern because of PMKSY	80.00	66.67	73.33	III
5.	The minimum age for the availing this scheme is 18 years	76.67	53.33	65.00	V
6.	PMKSY reduce inequality in distribution of farming family	66.67	50.00	58.33	VI
7.	PMKSY facilitated irrigation service to the beneficiary	70.00	40.00	55.00	VII
8.	PMKSY is helpful in reducing the spread of water scarcity in the country	56.67	50.00	53.33	VIII
9.	Agricultural University provided the knowledge about PMKSY	70.00	33.33	51.67	IX
10.	PMKSY to be used as a platform for Direct Benefits Transfer (DBT) for subsidies provided by Government under other schemes	70.00	30.00	50.00	X
11.	Beneficiary can be benefitted in any sub-scheme of Drip Irrigation, Sprinkler Irrigation or other under PMKSY	66.67	33.33	50.00	X
12.	PMKSY is the mission to take benefit for every farmer	63.33	30.00	46.67	XII
13.	We can take benefit of PMKSY in any Agriculture department	53.33	30.00	41.67	XIII
14.	SHG provided the knowledge about PMKSY	50.00	30.00	40.00	XIV
15.	Is known all the four components of PMKSY	40.00	36.67	38.33	XV
16.	PMKSY increase the reliability of the farmer in institute or training center of irrigation management	40.00	33.33	36.67	XVI
17.	"Per drop more crop" is the slogan of PMKSY	40.00	30.00	35.00	XVII
18.	Is PMKSY related to all the water resources	40.00	26.67	33.00	XVIII
19.	It is necessary to take benefit of sany irrigation scheme under PMKSY	53.33	10.00	31.67	XIX
20.	Rain water and stored water is also related to PMKSY	36.67	23.33	30.00	XX
21.	There is no need for daily visit of agriculture department	43.33	16.67	30.00	XX
22.	This scheme was inaugurated by PM Shree Narendra Modi	20.00	36.67	28.33	XXII
23.	Can we get all irrigation schemes only through PMKSY	30.00	23.33	26.67	XXIII
24.	PMKSY was started in 2015	20.00	16.67	18.33	XXIV
25.	NGO provided knowledge about PMKSY	16.67	13.33	15.00	XV

MPS= Mean per cent score

and ranked fourteenth, followed by "Is known all the four components of PMKSY" was also important knowledge areas with 38.33 MPS and ranked fifteenth by the respondent.

Table 2 further indicates that knowledge areas like "PMKSY increase the reliability of the farmer in institute or training centre of irrigation management" with MPS 36.67 and ranked sixteenth. Further, "Per drop more crop is the slogan of PMKSY" with MPS 35.00 and ranked seventieth. Statement "Is PMKSY related to all the water resources" with 33.00 MPS was ranked eightieth. Statement "It is necessary to take benefit of any irrigation scheme under PMKSY" with MPS 31.67 and ranked ninetieth, followed by "Rain water and stored water is also related to PMKSY" and "There is no need for daily visit of agriculture department" with 30.00 MPS and ranked twentieth by the respondents.

Table 2 further indicates that statement "This scheme was inaugurated by PM Shree Narendra Modi" which got 28.33 MPS and ranked twenty-two by the respondents, while, "Can we get all irrigation schemes only through PMKSY" got 26.67 MPS and ranked twenty-third by the respondents. Statement "PMKSY was started in 2015" with MPS 18.33 and ranked twenty-fourth, followed by "NGO provided knowledge about PMKSY" with 15.00 MPS ranked twenty-fifth by the respondent. The result was supported by Tripathi et al. (2018).

Knowledge level of beneficiary respondents in Chhoti Sadri tehsil : Table 3 reveals that out of total 60 respondents, majority of respondents (61.67%) were in medium level of knowledge group, whereas, 20.00 per cent respondents were observed in the high level of knowledge group and remaining 18.33 per cent respondents possessed low level of knowledge group about PMKSY.

Analysis of Table 3 further reveals that 3 (10.00%) beneficiary and 8 (26.67%) non-beneficiary respondents were observed in low level of knowledge group, while, 17 (56.67%) beneficiary and 20 (66.67%) non-beneficiary respondents were observed in medium level of knowledge group. Likewise, 10 (33.33%) beneficiary and 2 (6.66%) non-beneficiary respondents were observed in high level of knowledge group in the study area.

Kumari et al. (2022) concluded that the knowledge level of majority of farmers in western Haryana about the drip irrigation system was high (61.67%), followed by moderate (31.67%) level of knowledge. Also the results are supported by Chowdhary et al. (2018)

Aspect wise extent of knowledge of beneficiary respondents: It is evident from the data incorporated in Table 4 that "Progressive farmer provides the knowledge about PMKSY" was most favoured knowledge statement expressed by majority of the respondents with MPS 90.00 and ranked first. "PMKSY reduce the dependency of rain ware for irrigation" was second important knowledge statement perceived by the respondents with MPS 75.00 and ranked second.

Table 4 further shows that respondents

Table 3: Distribution of beneficiary respondents according to their knowledge about PMKSY

n=60

S.No.	Category	Beneficiary		Non-beneficiary		Total	
		f	%	f	%	f	%
1.	Low (<6.48)	3	10.00	8	26.67	11	18.33
2.	Medium (6.48 - 15.69)	17	56.67	20	66.67	37	61.67
3.	High (>15.69)	10	33.33	2	6.66	12	20.00
	Total	**30**	**100.00**	**30**	**100.00**	**60**	**100.00**

F = frequency, % = per cent

Table 4: Aspect wise knowledge of beneficiary respondents regarding PMKSY in Chhoti Sadri tehsil

n=60

S. No.	Statements	Beneficiary MPS	Non-beneficiary MPS	Total MPS	Overall Rank
1	Progressive farmer provides the knowledge about PMKSY	96.67	83.33	90.00	I
2	PMKSY reduce the dependency of rain water for irrigation	73.33	76.67	75.00	II
3	PMKSY reduce inequality in distribution of farming family	86.67	53.33	70.00	III
4	PMKSY is helpful in reducing the spread of water scarcity in the country	73.33	50.00	61.67	IV
5	We can change the cropping pattern because of PMKSY	46.67	73.33	60.00	V
6	Illiterate person can get benefit of PMKSY	36.67	76.67	56.67	VI
7	There is no need for daily visit of agriculture department	90.00	20.00	55.00	VII
8	PMKSY facilitated irrigation service to the beneficiary	63.33	36.67	50.00	VIII
9	PMKSY increase the reliability of the farmer in institute or training center of irrigation management	66.67	33.33	50.00	VIII
10	Can we get all irrigation schemes only through PMKSY	73.33	20.00	46.67	X
11	Is PMKSY related to all the water resources	73.33	16.67	45.00	XI
12	Beneficiary can be benefitted in any sub-scheme of Drip Irrigation, Sprinkler Irrigation or other under PMKSY	53.33	30.00	41.67	XII
13	PMKSY to be used as a platform for Direct Benefits Transfer (DBT) for subsidies provided by Government under other schemes	43.33	36.67	40.00	XIII
14	Rain water and stored water is also related to PMKSY	56.67	20.00	38.33	XIV
15	Agricultural University provided the knowledge about PMKSY	43.33	30.00	36.67	XV
16	Is known all the four components of PMKSY	46.67	26.67	36.67	XV
17	This scheme was inaugurated by PM Shree Narendra Modi	46.67	20.00	33.33	XVII
18	SHG provided the knowledge about PMKSY	43.33	20.00	31.67	XVIII
19	PMKSY is the mission to take benefit for every farmer	33.33	30.00	31.67	XVIII
20	We can take benefit of PMKSY in any Agriculture department	30.00	30.00	30.00	XX
21	It is necessary to take benefit of any irrigation scheme under PMKSY	50.00	6.67	28.33	XXI
22	The minimum age for the availing this scheme is 18 years	20.00	33.33	26.67	XXII
23	PMKSY was started in 2015	26.67	20.00	23.33	XXIII
24	NGO provided knowledge about PMKSY	20.00	16.67	18.34	XV
25	Per drop more crop is the slogan of PMKSY	16.67	13.33	15.00	XIV

MPS= Mean per cent score

considered the statement "PMKSY reduce inequality in distribution of farming family" with 70.00 MPS and ranked third. Likewise, knowledge statement "PMKSY is helpful in reducing the spread of water scarcity in the country" was ranked fourth with 61.67 MPS perceived by the respondents, followed by "We can change the cropping pattern because of PMKSY" with MPS 60.00 and ranked fifth

The table further show that "Illiterate person can get benefit of PMKSY" was the knowledge statement recorded with 56.67 MPS and ranked sixth. "There is no need for daily visit of agriculture department" with MPS 55.00 and ranked seventh. While, "PMKSY facilitated irrigation service to the beneficiary" and "PMKSY increase the reliability of the farmer in institute or training centre of irrigation management" were the both statements of knowledge recorded with MPS 50.00 and ranked eighth.

Table 4 further indicates that "Can we get all irrigation schemes only through PMKSY" with MPS 46.67 and ranked tenth. Besides, "Is PMKSY related to all the water resources" was also favoured knowledge statement which ranked eleventh with 45.00 MPS. Likewise the statement "Beneficiary can be benefitted in any sub-scheme of Drip Irrigation, Sprinkler Irrigation or other under PMKSY" obtained 41.67 MPS and ranked twelfth, while aspect like "PMKSY to be used as a platform for Direct Benefits Trasfer (DBT) for subsidies provided by Government under other schemes" with 40.00 MPS and ranked thirteenth. "Rain water and stored water is also related to PMKSY" with MPS 38.33 and ranked fourteenth. Further, "Agricultural University provided the knowledge about PMKSY" and "Is known all the four components of PMKSY" were the knowledge aspects recorded with 36.67 MPS and ranked sixteenth. The statement "This scheme was inaugurated by PM Shree Narendra Modi" with 33.33 MPS was ranked seventieth, while, the statement "SHG provided the knowledge about PMKSY" and "PMKSY is the mission to take benefit for every farmer" were the aspects which were ranked eightieth with MPS 31.67, followed by "We can take benefit of PMKSY in any Agriculture department" with 30.00 MPS and ranked twenty.

Table 4 further indicates that "It is necessary to take benefit of any irrigation scheme under PMKSY" was knowledge area recorded with 28.33 MPS and ranked twenty-one by the respondents, while, "The minimum age for the availing this scheme is 18 years" with 26.67 MPS and ranked twenty-two. "PMKSY was started in 2015" with MPS 23.33 and ranked twenty-third. Further, "NGO provided knowledge about PMKSY" with MPS 18.33 and ranked twenty fourth, followed by "Per drop more crop is the slogan of PMKSY" was favoured statement with 15.00 MPS and ranked twenty-fifth by the respondents. The result was supported by Patel et.al (2017) and Ghintala et.al (2013).

CONCLUSION

From the above findings, it may be concluded that out of total 60 respondents, majority of respondents were found in medium level of knowledge group, whereas, 20.00 per cent respondents were observed in the low level of knowledge group and remaining 16.66 per cent respondents possessed high level of knowledge group about PMKSY in Pratapgarh tehsil.

Further result showed that out of total 60 respondents, majority of respondents (61.67%) were in medium level of knowledge group, whereas, 20.00 per cent respondents were observed in the high level of knowledge group and remaining 18.33 per cent respondents possessed low level of knowledge group about PMKSY in Chhoti Sadri tehsil.

Beneficiary and non beneficiary respondents of Pratapgarh and Chhoti sadri tehsils possessed the maximum knowledge about the aspects like "Progressive farmer provides the knowledge about PMKSY" and "PMKSY reduce the dependency of rain water for irrigation". These aspects were ranked first and second by beneficiary and non beneficiary respondents of PMKSY.

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ECONOMICS OF ROSE CULTIVATION IN CHITTORGARH DISTRICT OF RAJASTHAN

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ABSTRACT

Rose is one of the most important flower crop in horticulture. It is a popular crop for both domestic and commercial cut flower. Rose also has medicinal value. Essential oil, vitamin A, B, E, and K, potassium and iron form the key medicinal components. Out of 13 tehsils in Chittorgarh, two tehsils namely Dungla and Bhadaser were selected based on the maximum area under rose crop. Five villages were selected randomly from two selected tehsils and 60 farmers were chosen randomly and data were collected for the rose crop year 2020-21. The overall cost of cultivation of rose crop in Chittorgarh district was found Rs. 130733.93 per hectare in which the total variable cost and total fixed cost was Rs. 109508.84 and Rs. 21225.09 per hectare. The percentage share of variable cost and fixed cost was 83.76 per cent and 16.24 per cent in total cost. The share of human labour (45.05 per cent) was found higher than other cost. The amortised establishment cost was ?13509.26 per hectare. The gross return and net return was Rs. 259193.88 and Rs. 128459.95 per hectare, respectively. The total production was 72.53 quintal per hectare in which fresh flower production was 66.02 quintal and dry flower production was 6.51 quintal per hectare. The overall cost of production was Rs. 1939.49 per quintal of rose flower. The overall cost A, cost B and cost C was found Rs. 55596.58, Rs. 88888.10 and 130733.93 per hectare. The farm business income and farm labour income were found Rs. 203597.30 and Rs. 170305.78 per hectare. The farm investment income was Rs. 161751.47 per hectare. The return per rupee ratio was found 1.98.

INTRODUCTION

Rose is one of the most important flower crops in horticulture. Rose is a woody perennial flowering plant of the genus Rosa, in the family Rosaceae. It is a popular crop for both domestic and commercial cut flower. Generally, it is used as a decorative in households and public garden. Rose also has medicinal value. The medicinal parts of the plant are the flower, petals, rose hips, root, root bark and essential oil. Essential oil, vitamin A, B, E, and K, potassium and iron form the key medicinal components. The extract of rose plant especially acts as antidepressant, antiseptic, anti-inflammatory, digestive stimulant, kidney tonic and menstrual regulator (Nanda and Das, 2015)

Rose is the most preferred flower in the international market. India has high potential for export of cut flower. India ranks 1st in area and production of cut roses and export only 0.20 to 0.40 percentage of global export trade. Top most cut roses producing countries in the world are India, China, Ecuador, Colombia, Kenya and Netherland, etc. More than 45 per cent area of world undercut rose is in India. In India, major cut flower producing states are West Bengal, Karnataka, Gujarat, Chhattisgarh, Maharashtra, Uttar Pradesh, Tamil Nadu, Madhya Pradesh and Andhra Pradesh. During 2013-2015, export of cut roses has increased but price of export cut flower decreased. The export of cut roses from India has declined in the countries like Australia and Japan and increased in Singapore, New Zealand and Malaysia. Increase in price of cut roses was relatively more in USA, Saudi Arabia, Australia and Netherland (Bhagat, et al., 2019). According to Agricultural and Processed

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Food Products Export Development Authority (APEDA), area of floriculture production in India was 305 thousand hectares in 2019-20. . The Production of flowers in India was 2301 thousand tonnes loose flowers and 762 thousand tonnes cut flowers in 2019-20. The country has exported 15,695.31 MT of floriculture products to the world for the worth of Rs. 575.98 Crores/77.84 USD Millions in 2020-21. USA, Netherland, UAE, UK, and Germany are major importing countries of Indian floriculture during the 2020-21(Source - APEDA).

According to ICAR-Directorate of Floriculture Research Annual Report 2017- 18, the traditional flowers are grown in an area of 3.09 lakh hectare and producing 22.46 lakh tonnes of loose flower and 4.84 lakh tones of cut flowers (National Horticulture Board 2016).

India also has significant proportion of trade in potted flowering plants, ornamentals foliage plants for landscaping, turf grasses, cut foliage, dry flowers, specialty flowers, annual flower seeds and fillers. The knowledge of cost of cultivation and returns from rose cultivation is very useful for the cultivators to adjust and coordinate the available resources in a profitable manner. The Government of India has identified floriculture as a sunrise industry and has high export-oriented status. Owing to steady increase in demand of flower, floriculture has become one of the important commercial trades in agriculture.

The present study was undertaken to work out the cost, return and profitability of rose cultivation

RESEARCH METHODOLOGY

In southern Rajasthan, Chittorgarh district has been purposively selected on the basis of higher area and production under rose cultivation. Out of 13 tehsils of Chittorgarh, Dungla and Bhadeser tehsils were selected on basis of maximum area under rose cultivation. A random sample of 60 rose farmers was taken from selected two tehsils. . Out of 60 rose farmers, 30 rose farmers of Dungla tehsil and 30rose farmers of Bhadaser tehsil were selected. 15 rose farmers of Dungla tehsil were selected from each village namely- Chikarda and Ghodakhera and 10 rose farmers of Bhadesar tehsil were selected from each village namely- Kuharon Ki Dhani, Baliyo Ki Dhani and Shankhlo Ki Dhani. Further rose farmer were divided in to three category on the basis of land holding by using cumulative square root frequency method as small (< 1.6 Ha), medium (1.6-3.2 Ha) and large (> 3.2 Ha). On an average, the area of rose cultivation was 0.25 hectare, 0.57 hectare and 1.13 hectare on small, medium and large farms, respectively. Tabular and statistical analysis was done for estimating cost of cultivation, cost of production and profitability of rose cultivation.

1. Cost of cultivation: For analyzing the cost of cultivation, the variable cost items and fixed cost items was considered. The variable cost included the farm expenditure on human labour, bullock labour, machine labour, fertilizer, manure, plant protection, irrigation, interest on working capital, manure, plant protection chemical etc. The fixed cost was calculated by adding the depreciation charges, rental value of owned land, annual amortised establishment cost, land revenue and interest on fixed capital etc. The annual amortised establishment was estimated by using establishment cost to spread it over the entire life period of rose crop. The total cost of production was calculated by adding all the expenditures on variable inputs and fixed inputs.

The cost of cultivation was calculated by using simple mathematical analysis and this included Cost A, Cost B, Cost C -

Establishment cost -

- Land preparation (ploughing + layout) (Rs.)
- Cost of digging trenches (Rs.)
- Cost of digging pit (Rs.)
- Cost of plant (Rs.)
- Cost of planting (Rs.)
- Other cost (Rs.)

Annual amortised establishment cost-

$$A = P\left(\frac{i(1+i)n}{(1+i)n-1}\right)$$

A= annual amortised establishment cost

P= present establishment cost

n= economical life of rose garden

i= interest rate at 12 per cent

Cost item -

1. Value of hired human labour (Rs.)
2. Value of bullock labour (Rs.)
3. Value of machine labour (Rs.)
4. Value of fertilizer (Rs.)
5. Value of manure (Rs.)
6. Value of plant protection (Rs.)
7. Value of Irrigation (Rs.)
8. Land revenue and taxes (Rs.)
9. Incidental charge (Rs.)
10. Interest on working capital (Rs.)
11. Depreciation on working capital (Rs.)

Cost- A (item 1 to 11)

12. Rental value of owned land / land rent of leased in land (Rs.)
13. Interest on fix capital (Rs.)
14. Amortised establishment cost (Rs.)

Cost-B (cost A + item 12+13+14)

15. Imputed family labour (Rs.)

Cost-C (cost B + item 15)

Income measure - To analyse the returns from the rose cultivation following concepts were used.

1. Gross income = Q_m x P_m

Where Q_m = quantity of main product

P_m = price of main product

There was no by- product of rose

2. Farm business income = Gross income - Cost A.
3. Farm labour income = Gross income - Cost B.
4. Net income = Gross income - Cost C.
5. Farm investment income = Farm Business Income - Imputed Value of Family Labour.

2. Cost of production

Cost of production was calculated by following formula-

Cost of production (per quintal) =

Profit analysis

The profit is the difference between total revenue and total cost incurred. Thus, net profit for any farm business can be written as:

Net profit = TR - TC

Where,

TR= Total Revenue

TC= Total Cost

RESULTS AND DISCUSSION

A. Input use in rose cultivation: In Chittorgarh district overall use of rose planting material was found 3981.36 plants per hectare. The use of planting material was found maximum for large size farm group and minimum for small size farm group. The overall use of FYM was found 14.41 tonnes per hectare of rose cultivation. It was found maximum for small size farm (18.40 tonnes/ ha) and minimum for large size farm (12.22 tonnes /ha). The use of fertilizers was found maximum in case of large size farm group (188.14 Kg/ha) and minimum in case of small size farm group (135.55Kg/ha). Overall use of fertilizer per hectare was 149.65 kg. It showed scare availability of FYM for large size farmer so high use of fertilizer per hectare. The overall use of human labour was 168.27 man-days per hectare for rose cultivation in which family labour was119.56 man-days and hired labour was 48.71 man-days per hectare. The use of human labour for rose cultivation was recorded highest for small size farm (173.68 man-days/ ha) and lowest for large size farm (154.44 man-days/ ha). It was observed

Table 1: Farm input use in physical quantity in rose cultivation Chittorgarh

Input	Small	Medium	Large	Overall
Planting material (no./ha)	3874.88	3947.65	4121.55	3981.36
FYM (tonnes/ ha)	18.40	13.24	12.22	14.41
Fertilizers (Kg/ha)	135.55	142.74	188.14	149.65
Plant protection (liter/ha)	4.57	3.25	2.02	3.44
Human labour (man days /ha)	173.68	162.28	154.44	168.27
(i) Family labour	125.95	113.33	101.67	119.56
(ii) Hired labour	47.73	48.95	52.78	48.71
Machine labour (hr/ha)	35.33	37.00	39.89	36.95
Electricity consumption for irrigation (unit/ha)	833.82	674.79	624.96	708.73

that use of family labour was highest for small size farm (125.95 man-days/ ha) and lowest for large size farm (101.67 man-days/ha) whereas use of hired human labour was found highest for large size farm (52.78 man-days/ ha) and lowest for small size farm (47.73 man-days/ha). It showed a decreasing trend with increases in size of land holding in respect of use of family labour and an increasing trend with increases of land holding in respect of use of hired human labour per hectare.

The use of machine labour was observed highest for large size group and lowest for small size group for rose cultivation. Overall use of machine labour was 36,95 hours/ ha for rose cultivation. The use of plant protection chemical was found maximum for small size group (4.57 liter/ ha) and Minimum for large size group (2.02 liter/ ha). Overall use of plant protection chemical for per hectare of rose cultivation was 3.44 liter/ ha. The electricity consumption for irrigation in rose cultivation per hectare was found maximum in case of small size farm and minimum in case of large size farm. Overall electricity consumption for irrigation in rose cultivation per hectare was 708.73 unit/ha.

B. Cost of cultivation of rose in Chittorgarh district: The overall cost of rose cultivation in Chittorgarh district of Rajasthan was Rs. 130733.93 in which the total fixed cost and the total variable cost was Rs. 21225.09 and Rs. 109508.84 which accounted for 16.24 and 83.76 per cent of total cost of cultivation respectively.

The overall percentage share in total cost per hectare was highest for human labour cost (45.05 per cent) followed by rental value of owned land, amortised establishment cost, FYM, interest on working capital, machine labour, irrigation charges, plant protection cost, fertilizer cost, interest on fixed cost and depreciation charges which accounted for 13.77 per cent, 10.33 per cent, 6.55 per cent, 6.19 per cent, 5.66 per cent, 4.70 per cent, 3.42 per cent, 1.87 per cent, 1.36 per cent and 1.10 per cent per hectare, respectively.

The total cost of rose cultivation was recorded higher in case of small size group i.e. Rs. 136793.46 than overall cost of cultivation (Rs. 130733.93). In case of medium and large size group, the cost of rose cultivation was estimated Rs. 127164.89 and Rs. 124628.29, respectively. On all three size group, highest percentage share in total cost was accounted for human labour cost which was 44.44 per cent, 44.67 per cent, 43.37 per cent per hectare on small, medium and large size group, respectively. The reason behind high human labour cost was due to picking rose flower required more human labour in rose cultivation.

The amortised establishment cost was higher in case large size group i.e. Rs. 14906.26 than overall amortised establishment cost (Rs. 13509.26). It was Rs. 13113.02 and Rs. 13435.73 on small and medium size group respectively. Percentage share

of amortised establishment cost in total cost was 9.59 per cent, 10.57 per cent, 11.96 per cent and 10.33 per cent per hectare on small, medium, large and overall size group, respectively.

The cost of FYM was recorded highest on small size group i.e. Rs. 11040.00 and lowest on large size group i.e. Rs. 6622.22. On medium and overall size group, it was Rs. 7942.86 and Rs. 8563.07 respectively. On small, medium, large and overall size group, the share of FYM cost was recorded 8.07 per cent, 6.25 per cent, 5.31 per cent and 6.55 per cent per hectare, respectively. Due to less availability of FYM to large farms group, the cost of FYM was found minimum on large size group.

The overall cost of fertilizer was Rs. 2438.84 per hectare. The cost of fertilizer was Rs. 2209.52, Rs. 2322.22 and Rs. 3066.77 on small, medium and large size group respectively which accounted for 1.62 per cent, 1.83 per cent and 2.46 per cent per hectare, respectively. The cost of plant

Table 2: Cost of cultivation of rose crop in Chittorgarh district

(Rs./Ha)

Input	Small	Medium	Large	Overall
Amortised establishment cost	13113.02	13435.73	14906.26	13509.26
	-9.59	-10.57	-11.96	-10.33
FYM	11040	7942.86	6622.22	8563.07
	-8.07	-6.25	-5.31	-6.55
Fertilizers	2209.52	2322.22	3066.67	2438.84
	-1.62	-1.83	-2.46	-1.87
Plant protection	5946.67	4228.57	2627.78	4471.34
	-4.35	-3.33	-2.11	-3.42
Human labour	60790	56800	54055.56	58894.57
	-44.44	-44.67	-43.37	-45.05
(i) Family labour	44083.33	39666.67	35583.33	41845.83
(ii) Hired labour	16706.67	17133.33	18472.22	17048.74
Machine labour	7094	7413.87	7977.78	7399.69
	-5.19	-5.83	-6.4	-5.66
Electricity charges for irrigation	7560	5735.71	5300	6140.95
	-5.53	-4.51	-4.25	-4.7
Interest on working capital	8383.22	8133.89	7233.01	8091.12
	-6.13	-6.4	-5.8	-6.19
Total variable cost	116136.43	106012.86	101789.27	109508.84
	-84.9	-83.37	-81.67	-83.76
Rental value of owned land	18000	18000	18000	18000
	-13.16	-14.15	-14.44	-13.77
Depreciation charges	922.47	1375.9	2921.23	1442.83
	-0.67	-1.08	-2.34	-1.1
Interest on fixed capital	1734.56	1776.12	1917.78	1782.26
	-1.27	-1.4	-1.54	-1.36
Total fixed cost	20657.03	21152.03	22839.01	21225.09
	-15.1	-16.63	-18.33	-16.24
Total cost	136793.46	127164.89	124628.29	130733.93
	-100	-100	-100	-100

protection was recorded higher on small size group i.e. Rs. 5946.67 than overall plant protection cost per hectare. On medium and large size group, it was Rs. 4228.57 and Rs. 2627.78 respectively which accounted for 3.33 per cent and 2.11 per cent per hectare respectively.

The cost of human labour was recorded higher on small size group i.e. Rs. 60790.00 than overall human labour cost (Rs. 58894.57). The human labour cost was found Rs. 56800 and Rs. 54055.56 on medium and large size group respectively. The family labour cost was estimated higher on small size group i.e. Rs. 44083.33 than other size group because most of family member of small size farm was engaged in their farm work. The cost of family labour was Rs. 39666.67, Rs. 35583.33 and Rs. 41845.83 on medium, large and overall size group per hectare respectively. The cost of hired human labour was higher in case of large size farms i.e. Rs. 18472.22 and lower in case of small size farm i.e. Rs. 16706.67 than overall hired human labour cost (Rs. 17048.74).

The overall machine labour cost was estimated Rs. 6162.80. The machine labour cost was higher on large size farms and lower on small size farms. It was Rs. 6067.67, Rs. 6160.90 and Rs. 6371.55 on small, medium and large size farms respectively. The irrigation charge was recorded higher in case of small size group (Rs. 7560.00) and lower in case of large size group (Rs. 5300). The overall irrigation cost was recorded Rs. 6140.95.

The overall interest on working capital was Rs. 8052.28. On small, medium and large size group, interest on working capital was Rs. 8588.56, Rs. 8020.40 and Rs. 7076.16 which accounted for 6.11 per cent, 6.12 per cent and 5.86 per cent respectively. The overall interest on fixed capital was Rs. 1787.80. It was estimated Rs. 1734.56, 1776.12 and Rs. 1962.12 on small, medium and large size group respectively. The rental value of owned land was same for all three category i.e.18000 per hectare. It was differ in term of percentage i.e. 12.80 per cent, 13.73 per cent, 14.91 per cent and 13.61 per cent on small, medium, large and overall size group respectively.

The total cost of cultivation of rose crop was Rs. 120731.03 per hectare on large size group. In case of medium size group, total cost of rose cultivation was Rs. 131054.25 per hectare. On small size group, the cost of rose cultivation was higher i.e. Rs. 140612.58 per hectare than overall cost of cultivation (Rs. 132239.46).

C. Economics of rose cultivation: In Chittorgarh district, the overall gross return and net return was found Rs. 323087.35 per hectare and Rs. 190847.90 per hectare respectively. The gross return was recorded highest on small size group i.e. Rs. 343106.67 per hectare followed by Rs. 322488.89 per hectare on large size group then Rs. 31529.24 per hectare on medium size group. The net return was Rs. 202494.09 per hectare, Rs. 184240.98 per hectare and Rs. 201757.86 per hectare on small, medium and large size group respectively.

Overall total production of rose flower was 72.53 quintal per hectare in which the production of fresh flower and dry flower was 66.02 quintal and 6.51 quintal per hectare respectively. The total rose production per hectare was recorded highest in case of large size group (76.37 quintal) and lowest in case of medium size group (71.23 quintal). On small size group, the total rose production was 74.08 quintal per hectare. The production of fresh rose flower was recorded 67.83 quintal, 64.73 quintal and 69.17 quintal per hectare on small, medium and large size group respectively. The dry flower production per hectare was higher on large size group (7.20 quintal) followed by medium size (6.50 quintal) then small size group (6.25 quintal).

The cost of rose flower production was found higher on small size group i.e. Rs. 1898.03 per quintal than overall cost of rose flower production (Rs. 1824.25). The cost of rose flower production was recorded Rs. 1839.94 per hectare and Rs. 1580.94 per hectare on medium size and large size group respectively.

D. Cost group: The overall cost A and cost B

were accounted 42.87 per cent and 68.24 per cent of cost C in Chittorgarh district respectively. On small size group, the cost A and cost B were found 44.15 per cent and 71.79 per cent of cost C. The cost A and cost B were accounted 41.02 per cent and 66.36 per cent of total cost on medium size group respectively. On large size group, cost A and cost B were 43.12 per cent and 70.52 per cent, respectively

Income measure of rose crop in Chittorgarh District

The overall gross income of rose cultivation was estimated Rs. 323087.35 per hectare in Chittorgarh district of Rajasthan. The overall farm business income and the overall farm labour income was Rs. 266388.91 and Rs. 232835.40 per hectare for rose cultivation respectively. The overall net income and overall farm business income over cost C was Rs. 190847.90 and Rs. 281099.85 per hectare respectively.

As shown in the table 6 per hectare gross income of rose crop in Chittorgarh district were Rs. 343106.67, Rs. 315295.24 and Rs. 322488.89 on small, medium and large size group respectively. The farm business income of rose cultivation was higher on small size group (Rs. 276801.58) and lower on medium size group (Rs. 261536.17). It was Rs. 270419.54 on large size farm per hectare.

Table 3: Cost and return from rose production in Chittorgarh district

S.N.	Particulars	Small n = 15	Medium n = 37	Large n = 8	Overall n = 60
1	Cost of cultivation (Rs./ha)	140612.58	131054.25	120731.03	132239.46
2	Gross return (Rs./ha)	343106.67	315295.24	322488.89	323087.35
3	Net return (Rs./ha)	202494.09	184240.98	201757.86	190847.9
4	Total production	74.08	71.23	76.37	72.53
	a) fresh flower (quintal per ha)	67.83	64.73	69.17	66.02
	b) Dry flower (quintal per ha) (1 Qt = 10 bag)	6.25	6.5	7.2	6.51
5	Cost of production (Rs./quintal)	1898.03	1839.94	1580.94	1824.25

Table 4: Cost of cultivation of rose crop according to cost concepts in Chittorgarh district

(Rs./ha)

S.N.	Particulars	Small	Medium	Large	Overall
1.	Total variable cost	117188.15	108951.15	97383.62	109660.99
		-83.34	-83.13	-80.66	-82.92
2.	Total fixed cost	23424.43	22102.89	23347.41	22578.47
		-16.65	-16.86	-19.33	-17.07
3.	Cost A	66305.09	53759.06	52069.38	56698.44
		-44.15	-41.02	-43.12	-42.87
4.	Cost B	100945.91	86970.92	85147.69	90251.96
		-71.79	-66.36	-70.52	-68.24
5.	Cost C	140612.58	131054.25	120731.03	132239.46
		-100	-100	-100	-100

Note : Figure in the parentheses are percentage of row cost C

The farm labour income was also higher on small size group (Rs. 242160.76) and lower on medium size group (Rs. 228324.32) than overall farm labour income (Rs. 232835.40). It was Rs. 237341.19 hectare on large size group.

In Chittorgarh district, the net income of rose crop per hectare over cost C was estimated higher in case of small size group i.e. Rs. 202494.09 followed by large size farm group (Rs. 201757.86) then medium size farm group (Rs. 184240.98). The farm investment income per hectare over cost C was estimated highest on small size group (Rs. 303440.00) and lower on medium size group (Rs. 271211.90) than overall farm investment income (Rs. 281099.85). On large size group, it was Rs. 286905.56 per hectare

The ratio of return per rupee was found highest in case of large size group i.e. 2.67 and lowest in case of medium size farm group i.e. 2.40 than overall ratio of return per rupee (2.44). The ratio was estimated 2.44 in case of small size group.

The cost of cultivation varied from Rs. 120731.03 to Rs. 140612.58 per hectare of rose in Chittorgarh district. The cost of cultivation was found higher on small size group (Rs. 140612.58) and lower on large size group (Rs. 120731.03) than overall cost of cultivation (Rs. 132239.46).

CONCLUSION

The results reveal that the cost of cultivation of rose crop in Chittorgarh district was Rs. 140612.58, Rs. 131054.25 and Rs. 120731.03 on small, medium and large size groups, respectively. The overall cost of cultivation of rose crop was Rs. 132239.46 per hectare in which total variable cost and fixed cost was Rs. 109660.99 and Rs. 22578.47 per hectare, respectively. The share of variable cost was 82.93 per cent of total cost while share of fixed cost was 17.07 per cent. The human labour (44.54 %) accounted for highest percentage in overall cost followed by total value of owned land, annual amortised establishment cost, FYM, interest on working capital, machine labour cost, plant protection cost, depreciation charge, fertilizer cost and interest on fixed capital which accounted for 13.61 per cent, 10.22 per cent, 6.48 per cent, 6.09 per cent, 4.66 per cent, 3.38 per cent, 2.11 per cent, 1.84 per cent and 1.35 per cent, respectively.

Overall gross income of rose crop during 2020-21 was found to be Rs. 323087.35 per hectare in Chittorgarh district. The net return over cost C was estimated of Rs. 190847.90 per hectare. The overall production of flower was 72.53 quintal per hectare out of which fresh flower production was 66.02 quintal per hectare and dry flower production was 6.51 quintal per hectare. Total production was highest on large size farm (76.37 quintal per hectare). The cost of rose production was estimated of Rs. 1898.03, Rs. 1839.94 and Rs. 1580.94 per quintal on small, medium and large size farm, respectively. The overall cost of rose production was Rs. 1824.25 per quintal.

The overall farm business income and farm labour

Table 5: Economics of rose crop in Chittorgarh district

(Rs./ha)

S.N.	Particulars	Small	Medium	Large	Overall
1.	Cost of cultivation	140612.58	131054.25	120731.03	132239.46
2.	Gross income	343106.67	315295.24	322488.89	323087.35
3.	Farm business income	276801.58	261536.17	270419.51	266388.91
4.	Farm labour income	242160.76	228324.32	237341.19	232835.40
5.	Net income	202494.09	184240.98	201757.86	190847.90
6.	Farm investment income	303440.00	271211.90	286905.56	281099.85
7.	Return per rupee	2.44	2.40	2.67	2.44

income in Chittorgarh district was estimated Rs. 266388.91 and Rs. 232835.40 per hectare. The farm business income and farm labour income was found higher in case of small size farm. The overall farm investment income was? 281099.85 per hectare. It was higher on small size farm. The return per rupee ratio was found 2.44, 2.40 and 2.67 on small, medium and large size farm, respectively. The overall return per rupee ratio was 2.44

Lack of awareness, scientific knowledge about cultivation and use of improved technology are main problem in study area. Thus, the main focus should be given on improve awareness level and use of proper techniques in rose cultivation by demonstration trails though concerred extension education workers and KVK so that the rose farmer can use proper input and get maximum benefit.

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CONSTRAINTS PERCEIVED BY THE AJWAIN GROWERS IN ADOPTION OF IMPROVED PRODCION TECHNOLOGY OF AJWAIN IN CHITTORGARH DISTRICT OF RAJASTHAN

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ABSTRACT

The present research study was conducted in Chittorgarh district of Rajasthan to find out the constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain. Five villages namely; Bhimgarh, Bamaniya, Adana, Baru and Jadana were selected from Rashmi tehsil of Chittorgarh randomly. From each of these selected villages 13 farmers were selected randomly. A sample total of 65 Ajwain growers was selected. The data from these farmers was collected using a well structured and pre tested interview schedule during the year 2021-22. The findings showed that the overall constraints perceived by Ajwain growers were financial constraints (57.12 MPS) as most important constraint followed by input constraint (49.91 MPS) and marketing constraint (46.21 MPS). Further, technical constraint (43.46 MPS) was perceived as least important constraint in adoption of improved production technology of Ajwain. Further, it can be concluded that "Unavailability of fertilizer at the peak seasons", " Lack of credit facilities", "Lack of knowledge about plant protection chemicals"," Minimum support price is not fixed by Govt." and "High cost of HYV seeds" were the major constraints perceived by the Ajwain growers. There is a need to provide trainings and organizing demonstrations to raise the knowledge and awareness among the Ajwain growers.

INTRODUCTION

Seed spices are the category of annual plants whose dried fruits or seeds are used as spices. Seed spices particularly cumin, fennel, fenugreek and Ajwain are valuable not only for home consumption but also for developing economic status of the farmers.

Ajwain (Trachyspermum ammi) is an annual herbaceous plant belonging to Apiaceae family. Mediterranean region in Egypt is the origin place of Ajwain. Ajwain falls under minor seed spices and is widely cultivated in arid and semi-arid regions. It is cultivated in India, Iran, Egypt and Afghanistan.

India is one of the leading countries in the world with respect to area, production and export of different seed spices. Rajasthan and Gujarat have emerged as "Seed Spices Bowl" and together they contribute 80% of the total seed spices production in the country. Madhya Pradesh, Uttar Pradesh, Punjab, Haryana, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu are also contributing to the total seed spices production of the country (Anonymous2020).

Ajwain is mainly cultivated for its seed and volatile oil (Thymol). Ajwain seed generally contains 2.5 to 5% essential oil and 26% fatty oils (Raghavan, 2007). The greyish brown seeds of Ajwain are usually considered for medical and nutritional purposes.

Rajasthan is a leading state in cultivation of spices. It has most suitable Agro-climatic conditions for the cultivation of different spice crops. India, Rajasthan has secured an unique place as it produces about 8-9 lakh t seed from about 8 lakh hectares area (Anonymous 2020). Therefore, it is high time to assess the constraints hindering the adoption of improved production technology of Ajwain by the Ajwain growers in Chittorgarh districts Rajasthan.

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RESEARH METHODOLOGY

The present study was conducted in Chittorgarh districts of Rajasthan. Chittorgarh district was selected purposively due to the reason that Chittorgarh district has the highest area (8,806 ha) and production (4,852 t) of Ajwain crop among all districts of Rajasthan (Anonymous 2019-20). Chittorgarh district comprises of 11 tehsils. Out of which Rashmi tehsil from Chittorgarh was selected as it has highest area and production under Ajwain crop among all tehsils of Chittorgarh.

From the selected tehsils, five Ajwain growing villages were selected; namely; Bhimgarh, Bamaniya, Adana, Baru and Jadana. From the selected villages, a sample of 13 farmers from each village was chosen randomly. In this way a sample of total 65 farmers was selected. To find out the constraints that hinders the adoption of improved production technology of Ajwain, a separate interview schedule was prepared. In order to interpret the results appropriate statistical tests was applied. The responses obtained from respondents were recorded on a three -point continuum namely high, medium and low extent. Mean Percent Score (MPS) for each of the constraints was calculated to find out the priority area of constraints in various aspects related involved in getting information.

Mean Percent Score was obtained by dividing the total score of each practice statement by maximum score obtained under each practice and multiplying it by hundred. The formula for calculation MPS is given below:

$$MPS = \frac{\text{Total score obtained by respondents}}{\text{maximum score obtained}} \times 100$$

RESULTS AND DISCUSSION

In this study the term constraint was used to denote the problems and obstacles which the farmers perceived in adoption of improved production technology of Ajwain.

1. Category wise constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain.

For the analysis of constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain, 31 major constraints was categorized into four different categories as technical, input, financial and marketing constraints. Each statement was assigned a rank according to the MPS obtained.

Input constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain: The data presented in Table-1 show that Ajwain growers reported the major constraints regarding input aspect being faced was unavailability of fertilizer at the peak seasons with 60.51 MPS. Followed by unavailability of short duration varieties, lack of irrigation facility and unavailability of good quality seeds at the time of

Table 1: Input constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain

S.No.	Input Constraints	MPS	Rank
	Unavailability of good quality seeds at the time of sowing	46.67	4
	Supply of inferior quality seeds	44.62	5
	Unavailability of fertilizer at the peak seasons	60.51	1
	Unavailability of recommended chemical for plant protection measures	41.03	6
	Lack of irrigation facility	50.77	3
	Unavailability of short duration varieties	55.90	2
	Overall	**49.91**	

sowing and supply of inferior quality seeds with 55.90, 50.77 and 46.67 MPS, respectively.

The constraints which faced to relatively least extend were Supply of inferior quality seeds and unavailability of recommended chemical for plant protection measures with 44.62 and 41.03 MPS.

The reason for facing these constraints was lack of knowledge, socio-economic factors and poor availability of quality seeds and plan protection measures in the Ajwain growing areas.

Similar findings were reported by Meena (2010) and Yadav (2021).

Technical constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain: The data in Table 2 indicate that the Ajwain growers reported that major constraints regarding technical aspect perceived was lack of knowledge about plant protection chemicals with 47.18 MPS. Followed by Lack of knowledge about cultivation of HYV, Lack of knowledge about seed treatment and Lack of knowledge about recommended seed rate with 46.67, 46.15 and 45.64 MPS, respectively.

The constraints which were faced to lesser extent were poor knowledge about dose of chemical fertilizer, lack of knowledge about chemical weed control and lack of knowledge about grading and standardization with 45.13, 41.03 and 40.51 MPS.

The least perceived constraints faced by them was poor knowledge about irrigation management with 35.90 MPS.

The analysis of the table clearly indicates that poor technical knowledge lead to various technical constraints hindering the adoption of improved production technology of Ajwain.

Similar findings were reported by Meena (2010) and Yadav (2021).

Marketing constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain: The data in Table 3 also reveal that the constraint minimum support price is not fixed by Govt.was the major marketing constraint faced by Ajwain growers with 73.85 MPS. Followed by transportation facilities are very costly, lack of storage facilities, lack of latest market information and lack of market for the commodity were major constraints related to marketing with 50.26, 46.67, 45.64 and 44.10 MPS, respectively.

They perceived moderate constraints namely lack of knowledge about market rate, low price of good quality produce in market and very high

Table 2: Technical constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain

S.No.	Technical Constraints	MPS	Rank
	Lack of knowledge about seed treatment	46.15	3
	Lack of knowledge about cultivation of HYV	46.67	2
	Lack of knowledge about grading and standardization	40.51	7
	Lack of knowledge about recommended seed rate	45.64	4
	Poor knowledge about dose of chemical fertilizer	45.13	5
	Lack of knowledge about plant protection chemicals	47.18	1
	Poor knowledge about irrigation management	35.90	8
	Lack of knowledge about chemical weed control	41.03	6
	Overall	**43.46**	

fluctuation in price with 41.03, 40.51 and 40.00 MPS respectively. The list constraint was perceived about mal practices by local businessman they perceived least constraints with 33.85 MPS.

Similar findings were reported by Meena (2010) and Yadav (2021).

Financial constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain: The analysis of Table 4 reveals that major constraint regarding financial aspects was high cost of HYV seeds with 62.05 MPS. Followed by high cost of labor, lack of credit facilities and high cost of inputs with 61.03, 60.51 and 56.92 MPS, respectively.

The constraints which were faced to lesser extent were high cost of weedicides, high cost of plant protection chemicals and high cost of equipments with 55.90, 55.38 and 54.87 MPS, respectively.

The least perceived constraints faced by them was high cost of fertilizers with 50.26 MPS.

This problem might be due to poor economic profile of the farmers, lack of credit facilities/ sources etc.

Similar finding were reported by Yadav (2021).

2. Overall constraints perceived by the Ajwain

Table 3: Marketing constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain

S.No.	Marketing Constraints	MPS	Rank
1.	Lack of storage facilities	46.67	3
2.	Transportation facilities are very costly	50.26	2
3.	Lack of knowledge about market rate	41.03	6
4.	Low price of good quality produce in market	40.51	7
5.	Mal practices by local businessman	33.85	9
6.	Minimum support price is not fixed by Govt.	73.85	1
7.	Very high fluctuation in price	40.00	8
8.	Lack of latest market information	45.64	4
9.	Lack of market for the commodity	44.10	5
	Overall	**46.21**	

Table 4: Financial constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain

S.No.	Financial Constraints	MPS	Rank
1.	Lack of credit facilities	60.51	3
2.	High cost of labour	61.03	2
3.	High cost of inputs	56.92	4
4.	High cost of equipments	54.87	7
5.	High cost of HYV seeds	62.05	1
6.	High cost of weedicides	55.90	5
7.	High cost of plant protection chemicals	55.38	6
8.	High cost of fertilizers	50.26	8
	Overall	**57.12**	

Table 5: Overall constraints perceived by the Ajwain growers in adoption of improved production technology of Ajwain

S. No.	Constraints	MPS	Rank
1.	Input Constraints	49.91	2
2.	Technical Constraints	43.46	4
3.	Marketing Constraints	46.21	3
4.	Financial Constraints	57.12	1
	Overall	**49.18**	

growers in adoption of improved production technology of Ajwain.

The data in Table 5 reveal overall constraints which could be responsible for lower adoption of improved production technology of Ajwain. The data depict that the constraints like "Financial constraints" was most perceived by the Ajwain growers with 57.12 MPS. "Input constraints" was second most important constraint which was having 49.91 MPS "Marketing constraints (46.21 MPS)" and "Technical constraints (43.46 MPS)" were found to be comparatively less important constraints and were ranked third and fourth, respectively.

Similar finding are reported by Jaitawat (2007) and Yadav (2021).

CONCLUSION

It can be concluded that financial constraint (57.12 MPS) was perceived as the most important constraint followed by Input Constraint (49.91MPS) and Marketing Constraint (46.21 MPS). Further, Technical Constraint (43.46 MPS) was perceived as least important constraint in adoption of improved production technology of Ajwain by Ajwain growers of Chittorgarh district of Rajasthan.

Aspect wise constraints revealed that "Unavailability of fertilizer at the peak seasons", " Lack of credit facilities", "Lack of knowledge about plant protection chemicals"," Minimum support price is not fixed by Govt." and "High cost of HYV seeds" was major constraints perceived by the Ajwain growers. There is a need to provide trainings and organizing demonstrations to raise the knowledge and awareness among the farmers.

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SOCIO-ECONOMIC PROFILE OF THE DAIRY FARMERS OF JAMMU REGION

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ABSTRACT

The present study was conducted in purposely selected Jammu district of Jammu and Kashmir to study the socio-economic profile of dairy farmers. The data were collected with the help of pretested interview schedule by personal interview method. The collected data were analyzed by using simple statistical methods like frequency and mean percentage score. It was found that majority of the respondents belonged to the age group of 39 to 53 years; were educated up to middle standard; were following agriculture + dairy farming and had moderate experience in dairying. Most of them had nuclear family of large family size and belonged to general caste. Further, majority of the dairy farmers had marginal land holding and medium level of social participation, credit behaviour and annual income.

INTRODUCTION

Dairy farming has been an important part of the agricultural scenario for thousands of years. India being a predominantly agrarian economy has about 70 per cent of its population living in villages, where livestock play a crucial role in the socio-economic life. Livestock provide high-quality foods such as milk, cheese, butter, ghee, etc. India is not only one of the top producers of milk in the world, but also the largest consumer of milk and milk products in the world. Agriculture and animal husbandry have a symbiotic relationship, in which the agricultural sector provides feed and fodder for the livestock and animals provide milk, manure and draught power for various agricultural operations. It has created a lot of employment opportunities and also provides improved nutritional benefits. Livestock is emerging an important sector in the economy of Jammu and Kashmir and plays an important role in the socio-economic development of the State (Digest of Statistics, 2020-21). In Jammu and Kashmir agriculture sector contributes 16.18 per cent to J&K's GDP, of which 35 per cent is contributed by the Dairy Sector (19th Livestock census, 2012). Dairying is a potential source of additional income for the rural people of the State and is instrumental in bringing socio-economic transformation in J&K.

RESEARCH METHODOLOGY

The present study was conducted in purposely selected Jammu district of Jammu and Kashmir as it had maximum milch bovine population. Jammu district consists of 20 blocks, out of which two blocks *viz*., R.S. Pura and Akhnoor were selected based on maximum milch bovine population. Then from each of the selected block, five villages which fall within the radius of 15 km from the block headquarters were selected on the basis of possessing highest milch bovine population. Thus, in all, 10 villages were taken for the study. After knowing the number of dairy owners in each village, a proportionate sample of 200 respondents was selected from these villages. Further, on the basis of number of milch animals (bovine) possessed by them, the respondents were divided into three categories of small, medium and large dairy farmers. Thus, there were 80, 68 and 52 small, medium and large dairy farmers, respectively.

RESULTS AND DISCUSSION

Age of the Respondents:

A perusal of data presented in Table 1 vividly corroborate that majority of the dairy farmers i.e., 121 (60.50 per cent) belonged to the age group of 39 to 53 years. Whereas, 47 (23.50 per cent) dairy farmers were reported from age group of below 39

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years and remaining 32 (16.00 per cent) were found in the age group of above 53 years.

A close observation of data further indicate that equal number (i.e., 43) of small and medium dairy farmers and 35 (67.30 per cent) large dairy farmers belonged to the age group of 39 to 53 years. Whereas, 26 (32.50 per cent) small, 15 (22.06 per cent) medium and 6 (11.54 per cent) large dairy farmers were found in the age group of below 39 years. Likewise, the representation of small, medium and large dairy farmers in the age group of above 53 years were 11 (13.75 per cent), 10 (14.70 per cent) and 11 (21.16 per cent), respectively.

Education of the respondents:

It is evident from the data presented in Table 2 that 27.50 per cent of the dairy farmers were educated upto middle standard followed by more than one-fifth (21.00 per cent) of them having education upto matric standard. 18.50 per cent of the respondents were illiterate and 16.50 per cent were educated upto primary standard. However, only 9.00 per cent of the respondents were graduate and 7.50 per cent had education upto higher secondary level (10+2).

A deep glance at the data further reveal that exactly one-fourth (25.00 per cent) of the small dairy farmers were educated upto matric standard followed by 23.75 per cent and 17.50 per cent of them having middle and primary education. Equal number of small dairy farmers i.e., 10 (12.50 per cent) were educated upto higher secondary (10+2) and graduation level. However, only 8.75 per cent small dairy farmers were illiterate.

A close observation of the data incorporated in Table 2 indicate that 38.23 per cent of the medium dairy farmers were educated up to middle standard

Table 1: Distribution of respondents according to their age

n= 200

S. No.	Age group	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Below 39 years	26	32.50	15	22.06	6	11.54	47	23.50
2.	39 to 53 years	43	53.75	43	63.24	35	67.30	121	60.50
3.	Above 53 years	11	13.75	10	14.70	11	21.16	32	16.00
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = per cent

Table 2: Distribution of respondents according their educational status

n = 200

S. No.	Educational status	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Illiterate	7	8.75	7	10.30	23	44.23	37	18.50
2.	Primary	14	17.50	8	11.76	11	21.16	33	16.50
3.	Middle	19	23.75	26	38.23	10	19.23	55	27.50
4.	Matriculate	20	25.00	16	23.52	6	11.54	42	21.00
5.	Higher secondary	10	12.50	4	5.89	1	1.92	15	7.50
6.	Graduate	10	12.50	7	10.30	1	1.92	18	9.00
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

followed by nearly one-fourth (23.52 per cent) matriculate and 11.76 per cent educated upto primary level. 10.30 per cent each of the medium dairy farmers were illiterate and graduate. However, only 5.89 per cent of them were educated upto high secondary (10+2) level.

A further perusal of data indicate that 44.23 per cent of the large dairy farmers were illiterate followed by 21.16 per cent of them having primary education. Besides, nearly one-fifth (19.23 per cent) of them were educated upto middle standard and 11.54 per cent were matriculate. However, equal number of large dairy farmers i.e., 1.92 per cent were educated upto higher secondary (10+2) and graduation level.

Occupation:

It is evident from the data contained in Table 3 that more than half of the dairy farmers i.e., 52.50 per cent were following agriculture + dairy farming followed by nearly one-fifth (19.50 per cent) of them engaged in dairy farming only. 14.50 per cent of the respondents were doing agriculture + service + dairy farming and 13.50 per cent of them were involved in agriculture + business + dairy farming.

A close observation of data further indicate that more than half of the small dairy farmers i.e., 53.75 per cent were following agriculture + dairy farming. 22.50 per cent of the them were involved in agriculture + service + dairy farming and nearly one-fifth (18.75 per cent) of them belonged to agriculture + business + dairy farming. However, only 5.00 per cent of them were engaged in dairy farming only.

A further perusal of data show that majority of the medium dairy farmers (61.77 per cent) were following agriculture + dairy farming followed by 14.70 per cent of them engaged in agriculture + business + dairy farming. Besides, 13.23 per cent of the respondents were doing agriculture + service + dairy farming. However, only 10.30 per cent of medium dairy farmers were following dairy farming only.

A deep glance at the data further reveal that more than half of the large dairy farmers i.e., 53.85 per cent were practicing dairy farming only followed by 38.47 per cent of them engaged in agriculture + dairy farming. Equal number of large dairy farmers i.e., 2 (3.84 per cent) were engaged in agriculture + business + dairy farming and agriculture + service + dairy farming.

Experience in dairying:

Data given in Table 4 indicate that majority of the dairy farmers (63.50 per cent) had moderate experience in dairy farming. Besides, 38 (19.00 per cent) dairy farmers had more and 35 (17.50 per

Table 3: Distribution of respondents according to their occupation

n = 200

S. No.	Occupation	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Dairy farming only	4	5.00	7	10.30	28	53.85	39	19.50
2.	Agriculture + Dairy farming	43	53.75	42	61.77	20	38.47	105	52.50
3.	Agriculture + Business + Dairy farming	15	18.75	10	14.70	2	3.84	27	13.50
4.	Agriculture + Service + Dairy farming	18	22.50	9	13.23	2	3.84	29	14.50
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

cent) dairy farmers had less experience in dairying.

A close observation of data further reveal that in case of small dairy farmers, 50 (62.50 per cent) had moderate experience, 17 (21.25 per cent) has less experience and 13 (16.25 per cent) had more experience in dairying. Whereas, in case of medium dairy farmers 43 (63.24 per cent) had moderate experience, 15 (22.06 per cent) had more experience and only 10 (14.70) had less experience in dairy venture. However, in case of large dairy farmers, 34 (65.38 per cent) had moderate experience, 10 (19.23 per cent) had more experience and only 8 (15.39 per cent) had less experience in dairy farming.

Family type:

A perusal of data contained in Table 5 vividly corroborate that majority of the dairy farmers (64.00 per cent) had nuclear families, whereas 36.00 per cent had joint families.

A deep glance at the data further reveal that in case of small dairy farmers, 70.00 per cent had nuclear families and 30.00 per cent had joint families. Whereas, in case of medium dairy farmers, 69.11 per cent had nuclear families and 30.89 per cent had joint families. However, in case of large dairy farmers, 48.07 per cent had nuclear families and 51.93 per cent had joint families.

Family size:

The data presented in Table 6 show that 62.50 per cent of the respondents had large families and remaining 37.50 per cent respondents had small families.

In case of small dairy farmers, 52.50 per cent had small families and 47.50 per cent had large families. Contrary to it, in case of medium dairy farmers, 41.17 per cent had small families and 58.83 per cent had large families. However, in case of large dairy farmers, only 5 (9.61 per cent) had small

Table 4: Distribution of respondents according to their experience in dairying

n = 200

S. No.	Experience in dairying	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Less (below 7 years)	17	21.25	10	14.70	8	15.39	35	17.50
2.	Moderate (7 to 15 years)	50	62.50	43	63.24	34	65.38	127	63.50
3.	More (Above 15 years)	13	16.25	15	22.06	10	19.23	38	19.00
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

Table 5: Distribution of respondents according to their family type

n= 200

S. No.	Family type	Small dairy farmers		Medium dairyfarmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Nuclear	56	70.00	47	69.11	25	48.07	128	64.00
2.	Joint	24	30.00	21	30.89	27	51.93	72	36.00
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

Table 6: Distribution of respondents according to their family size

n= 200

S. No.	Family size	Small dairy farmers		Medium dairyfarmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Small (Up to 5 members)	42	52.50	28	41.17	5	9.61	75	37.50
2.	Large (above 5 members)	38	47.50	40	58.83	47	90.39	125	62.50
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

Table 7: Distribution of respondents according to their caste

n = 200

S. No.	Caste group	Small dairy farmers		Medium dairyfarmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Scheduled caste	29	36.25	20	29.41	2	3.85	51	25.50
2.	Scheduled tribe	2	2.50	7	10.30	33	63.46	42	21.00
3.	Other backward caste	18	22.50	12	17.64	4	7.69	34	17.00
4.	General caste	31	38.75	29	42.65	13	25.00	73	36.50
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

families, whereas majority i.e., 47 (90.39 per cent) of them were from large family group.

Caste:

A perusal of data included in Table 7 explicate that 36.50 per cent of the dairy farmers belonged to general caste followed by 25.50 per cent of them were from scheduled caste, 21.00 per cent were from scheduled tribe and 17.00 per cent were from other backward caste categories.

A further perusal of the data reveal that 38.75 per cent of small dairy farmers belonged to general caste followed by 36.25 and 22.50 per cent of them were from scheduled caste and other backward caste categories. However, only 2 (2.50 per cent) small dairy farmers were from scheduled tribe category.

A deep glance of the data reveal that 42.65 per cent of medium dairy farmers were from general caste followed by 29.41 and 17.64 per cent of them were from scheduled caste and other backward caste categories. However, only 7 (10.30 per cent) medium dairy farmers were from scheduled tribe category.

Data regarding large dairy farmers indicate that majority (63.46 per cent) of them were scheduled tribes. However, exactly one-fourth (25.00 per cent) of them belonged to the general caste, 7.69 per cent were from other backward caste and only 3.85 per cent were scheduled caste.

Size of land holding:

The data contained in Table 8 show that more than one-third (34.50 per cent) of the dairy farmers had marginal land holding followed by 31.00 per cent of them having small land holding. 17.50 per cent of the respondents had no holding, whereas 17.00 per cent of them were large farmers having

land holding above 2 hectares.

A close observation of the data further indicate that in case of small dairy farmers, 42.50 per cent had marginal holding followed by more than one-third (35.00 per cent) of them having small land holding and 17.50 per cent were large farmers having land holding above 2 hectares. However, only 4 (5.00 per cent) small dairy farmers had no land holding.

A perusal of data further show that 44.11 per cent of the medium dairy farmers were having marginal land holding followed by slightly above one-third (33.83 per cent) of them having small land holding and 14.70 per cent had large holding. However, only 5 (7.36 per cent) medium dairy farmers had no land holding.

In case of large dairy farmers, exactly half (50.00 per cent) had no land holding followed by 21.15 per cent of them having small land holding and nearly one-fifth (19.23 per cent) had large land holding. However, only 5 (9.62 per cent) medium dairy farmers possessed marginal land holding.

Social Participation:

Data given in Table 9 show that 46.00 per cent of dairy farmers had medium level of social participation followed by 30.50 per cent having low and 23.50 per cent having high level of social participation.

A deep glance at the data incorporated in Table 9 indicate that 47.50 per cent of small dairy farmers had medium level of social participation. Besides, 24 (30.00 per cent) had low and 18 (22.50 per cent) had high level of social participation.

Data regarding medium dairy farmers reveal that 45.59 per cent of them had medium level of social participation. Whereas, 21 (30.88 per cent) had high and 16 (23.53 per cent) had low level of social participation.

Table 8: Distribution of respondents according to their land holding

n = 200

S. No.	Size of land holding	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	No land holding	4	5.00	5	7.36	26	50.00	35	17.50
2.	Marginal (Below 1 ha)	34	42.50	30	44.11	5	9.62	69	34.50
3.	Small (1 to 2 ha)	28	35.00	23	33.83	11	21.15	62	31.00
4.	Large (Above 2 ha)	14	17.50	10	14.70	10	19.23	34	17.00
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

Table 9: Distribution of respondents according to their level of social participation

n= 200

S. No.	Level of social participation	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Low	24	30.00	16	23.53	21	40.38	61	30.50
2.	Medium	38	47.50	31	45.59	23	44.23	92	46.00
3.	High	18	22.50	21	30.88	8	15.39	47	23.50
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

Table 10: Distribution of respondents according to their credit behaviour

n = 200

S. No.	Level of credit behaviour	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Low	28	35.00	22	32.35	26	50.00	76	38.00
2.	Medium	44	55.00	39	57.35	22	42.30	105	52.50
3.	High	8	10.00	7	10.30	4	7.70	19	9.50
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

Table 11: Distribution of respondents according to their annual income

n = 200

S. No.	Level of annual income	Small dairy farmers		Medium dairy farmers		Large dairy farmers		Total	
		F	%	F	%	F	%	F	%
1.	Low	6	7.50	0	0.00	0	0.00	6	3.00
2.	Medium	42	52.50	32	47.06	33	63.46	107	53.50
3.	High	32	40.00	36	52.94	19	36.54	87	43.50
	Total	**80**	**100**	**68**	**100**	**52**	**100**	**200**	**100**

F = Frequency, % = Per cent

However, 23 (44.23 per cent) large dairy farmers had medium level of social participation followed by 21 (40.38 per cent) had low and 8 (15.39 per cent) had high level of social participation.

Credit behaviour:

A perusal of data given in Table 10 reveal that more than half of the dairy farmers i.e., 105 (52.50 per cent) had medium level of credit behaviour followed by 76 (38.00 per cent) having low and only 19 (9.50 per cent) having high level of credit behaviour.

Further observation of data incorporated in Table 10 indicate that more than half of the small dairy farmers i.e., 44 (55.00 per cent) had medium level of credit behaviour, 28 (35.00 per cent) had low and only 8 (10.00 per cent) had high level of credit behaviour. Data regarding medium dairy farmers vividly corroborate that 39 (57.35 per cent) of them had medium level of credit behaviour, 22 (32.35 per cent) had low and only 7 (10.30 per cent) had high level of credit behaviour. However, in case of large dairy farmers, exactly half (50 per cent) had low level of credit behaviour, 22 (42.30 per cent) had medium and only 4 (7.70 per cent) had high level of credit behaviour.

Annual Income:

The data incorporated in Table 11 reveal that more than half of the dairy farmers (53.50 per cent) fell under medium annual income category. Besides, 87 (43.50 per cent) and 6 (3.00 per cent) respondents were found in high and low annual income categories.

A deep glance at the data further indicate that 42 (52.50 per cent) small dairy farmers had medium annual income. However, the small dairy farmers reported from high and low annual income categories were 32 (40.00 per cent) and 6 (7.50 per cent), respectively. In case of medium dairy farmers, 36 (52.94 per cent) had high annual income. Besides, 32 (47.06 per cent) respondents were found in

medium annual income category. Interestingly, none of the medium dairy farmers had low annual income. Whereas, in case of large dairy farmers, 33 (63.46 per cent) respondents belonged to medium annual income group. Besides, 19 (36.54 per cent) respondents fell under high annual income group. However, none of the large dairy farmers had low annual income.

CONCLUSION

It is concluded that for socio-economic development of the dairy farmers, the concerned authority should educate and motivate the dairy farmers to adopt latest animal productions interventions through mass awareness programmes of dairy development. The government should provide assistance for cattle and buffalo development in the form of subsidy for purchasing of improved breeds of milch cattle and buffalo, fodder, improved fodder seeds, concentrates, mineral mixture, chaff cutting machines, construction of cattle shed and purchasing of necessary dairy utensils.

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SOCIO-ECONOMIC STATUS OF SOIL HEALTH CARD HOLDERS IN UDAIPUR DISTRICT OF RAJASTHAN

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ABSTRACT

Agriculture is the backbone of the Indian economy and hence, the very existence of economic activities of the population of the country is dependent on the state and health of its agriculture sector. The study was undertaken with a view to assess the socio-economic status of farmers regarding Soil Health Card (SHC) scheme in Udaipur district of Rajasthan. The random sampling technique was used for selection of sample which comprised of 200 farmers. Study was based on primary data collected during the year 2018-19 through survey method. Simple tabular analysis was used to present the findings. The study concluded that respondent farmers belonged to medium socio-economic status in general. They fall in middle income group with small and marginal size of land holding. Majority of farmers belonged to nuclear type of family, membership in one organization of social participation group, personal source as a source of information and fifty five per cent soil health card holders belonged to small size of family.

INTRODUCTION

Agriculture is the backbone of the Indian economy and hence, the very existence of economic activities of the population of the country is dependent on the state and health of its agriculture sector.

Soil health and fertility is the basis for sustainable profitability of the farmers (Ban *et al.*, 2020). Using optimal doses of fertilizers and cropping pattern as per the scientific recommendation is the first step towards sustainable farming. Soil testing is a science based and time-tested tool for assessment of soil fertility status and soil ailments and for nutrient amendment recommendations. Soil testing, as a tool for judicious fertilizer use, works on the principle of profitability, meaning if all other factors of production are at optimum and none of them limiting, there is all probability to obtain more profitable response to applied nutrients based on soil testing than those applied on adhoc basis. In India, the current consumption of NPK ratio is 6.7:2.4:1, which is highly skewed towards nitrogen as against ideal ratio of 4:2:1. There is a need for balanced use of fertilizers, keeping this government of India introduced soil health card scheme (SHCs) across India. On 5th December 2015 the ministry of agriculture introduced the Soil Health Card (SHC) scheme. The SHC scheme has been approved for implementation during the remaining period of 12th plan. SHC will be provided to all farmers in the country at an interval of two years to enable the farmers to apply recommended doses of nutrients based on soil test values to realize improved and sustainable soil health and fertility, low costs and higher profits (Reddy, 1997).

RESEARCH METHODOLOGY

The Ex-post-facto research design was used for present study. The present investigation conducted in Udaipur district of Rajasthan which means "city of lakes". The state of Rajasthan consists of thirty three districts, out of which Udaipur district was selected on the basis of soil health card holders belonged to maximum cultivated area of tehsils of Udaipur districts namely, Mavli and Vallabhnagar

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tehsils. From the selected area, 10 villages were selected from each tehsil and 10 number of soil health card holders were selected from each selected village with the help of random selection technique. Thus, a total of 200 soil health card holders were included in the sample of study.

REASULTS AND DISCUSSION

Personal characteristics of the soil health card holders

With regards to age group of respondents, Table 1 reveals that majority (66.50 %) of the soil health card holders were belonging to middle age group (32 to 56 years), followed by 19.50 per cent and 14.00 per cent of the farmers who were belonging to old age group (above 56 year) and young age group (upto 32 year), respectively. The possible reasons for the above trend might be due to the fact that middle aged farmers were optimistic, have interest and ready to take up any new technologies to earn profit. The results are in conformity with the results of Jayanta *et al.* (2012), Madhushekar (2009) and Subhash (2018).

In case of respondents' education level, it can be observed from Table 2 that majority (22.00 %) of the farmers had secondary level of education followed by senior secondary, primary, middle, can read and write, illiterate, can read only and graduate and above level of education with 18.00, 14.00, 13.50, 11.50, 9.00, 9.00 and 3.00 per cent, respectively. The probable reason behind the majority of soil health card holders being educated

Table 1: Age of soil health card holders

n=200

S.No.	Age Group	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Young (up to 32 year)	15	15.00	13	13.00	28	14.00
2.	Middle (from 32 -56 year)	63	63.00	70	70.00	133	66.50
3.	old (above 56 year)	22	22.00	17	17.00	39	19.50
	Total	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

Table 2: Education level of soil health card holders

n=200

S.No.	Farmer's Education	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Illiterate	11	11.00	7	7.00	18	9.00
2.	Can read only	6	6.00	12	12.00	18	9.00
3.	Can read and write	17	17.00	6	6.00	23	11.50
4.	Primary	22	22.00	6	6.00	28	14.00
5.	Middle	12	12.00	15	15.00	27	13.50
6.	Secondary	15	15.00	29	29.00	44	22.00
7.	Senior secondary	16	16.00	20	20.00	36	18.00
8.	Graduate and above	1	1.00	5	5.00	6	3.00
Total	**100**	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

up to secondary might be due to their poor financial conditions and availability of secondary level schools in their village. Lack of facilities for higher education in nearby areas, which forces them to travel to cities to pursue college education that may also be the reason for lesser percentage. The reason behind illiterates could be their lack of interest, lack of encouragement from family members and their poor economic status. Therefore, extra efforts are needed to educate the illiterates and school drop-outs through adult education and functional literacy programs in villages to increase the level of education.

Table 3 reveals that 63.00 per cent soil health card holders were belonging to nuclear type of family, whereas, 37.00 per cent of soil health card holders belonged to joint type of family. Among the respondents from Mavli tehsil, 66.00 per cent were belonging to nuclear type of family and 34.00 per cent belonged to joint type of family. In case of Vallabhnagar tehsil, 60.00 per cent respondents belonged to nuclear type of family and 40.00 per cent respondents belonged to joint type of family.

In case of family size of respondents, Table 4 reveals that 55.00 per cent soil health card holders belonged to small size of family. Whereas, 45.00 per cent of soil health card holders belonged to big size of family. Among the respondents belonged to Mavli tehsil, out of them 62.00 per cent were belonging to small size of family and only 38.00 per cent belonged to big size of family. In case of Vallabhnagar tehsil, 48.00 per cent respondents belonged to small size of family and 52.00 per cent respondents were belonging to big size of family.

With regards to annual income of respondents, Table 5 also shows that majority (61.50 %) of the soil health card holders belonged to less than 1 lac rupees annual income group. Followed by 1 to 2.5 lac, 2.5 to 5 lac and more than 5 lac of annual income group with 28.50, 8.00 and 3.00 per cent, respectively. The probable reason which could be attributed to varied income categories of farmers, annual income, source of income might be more than one and using improved practices of farming for more income generation.

Table 6 reveals that majority (55.00 %) of the soil health card holders had marginal size of land holding, followed by small, semi medium, and

Table 3: Family type of the soil health card holders

n=200

S.No.	Family type	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Nuclear	66	66.00	60	60.00	126	63.00
2.	Joint	34	34.00	40	40.00	74	37.00
	Total	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

Table 4: Family size of the soil health card holders

n=200

S.No.	Family size	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Small (up to 5 members)	62	62.00	48	48.00	110	55.00
2.	Big (>5 members)	38	38.00	52	52.00	90	45.00
	Total	**100**	**100**	**100**	**100**	**200**	**100**

Table 5: Annual income of soil health card holders

n=200

S.No.	Annual income	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Less than Rs. 100000	65	(65.00)	56	(56.00)	121	61.50
2.	Rs. 100000 to 250000	25	(25.00)	32	(32.00)	57	28.50
3.	Rs. 250000 to 500000	7	(7.00)	9	(9.00)	16	8.00
4.	More than Rs. 500000	3	(3.00)	3	(3.00)	6	3.00
	Total	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

Table 6: Land holding of soil health card holders

n=200

S.No.	Land holding	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Marginal (<1 ha)	57	57.00	53	53.00	110	55.00
2.	Small (1-2 ha)	24	24.00	34	34.00	58	29.00
3.	Semi-medium (2-4 ha)	15	15.00	11	11.00	26	13.00
4.	Medium (4-10 ha)	4	4.00	2	2.00	6	3.00
5.	Large (>10 ha)	0	0.00	0	0.00	0	0.00
	Total	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

medium size of land holding with 29.00, 13.00 and 3.00 per cent respectively. In case of large size of land holding no any farmer were existing from the selected study area. It could be inferred that majority of the soil health card holders had possessed marginal size of land holding. It might be due to fragmentation of land within the family at rural area. The results are in conformity with the results of Ambedkar (2010).

The data presented in Table 7 reveal that majority of the respondents (45.50 %) had membership in one organization of social participation group, followed by 37.50 and 14.00 per cent of soil heath card holders were engaged in no participation and member of more than one organization, respectively. Only 3.00 per cent soil health card holders were belonged to lay leader category of social participation.

Thus, it can be concluded that approximate half (45.50 %) of the respondents associated with no participation to member of one organization under social participation towards soil health card. It might be due to the availability of any one organization in same village or nearby the village for providing the various information related to new farming technologies.

It was obvious from the Table 8 that the majority of soil health card holders had personal source as a source of information with 49.50 per cent, out of them 56.00 per cent respondents were from Vallabhnagar and 43.00 per cent respondents were from Mavli tehsil of Udaipur district. In case of electronic media, 36.50 per cent of respondents were belonging to this group of social participation, out of them 39.00 per cent respondents were from Mavli tehsil and 34.00 per cent were from Vallabhnagar tehsil of Udaipur district. Whereas, only 14.00 per cent soil heath card holders had print media as a source of information, out of them 18.00 per cent respondents were belonging to Mavli tehsil and 10.00 per cent respondents were from Vallabhnagar tehsil. Thus, it can be concluded that half (49.50 %) of the respondents had personal source as a source of information.

Table 7: Social participation of soil health card holder

n=200

S.No.	Social participation	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	No participation	39	39.00	36	36.00	75	37.50
2.	Member of one organization	43	43.00	48	48.00	91	45.50
3.	Member of more than one organization	15	15.00	13	13.00	28	14.00
4.	Lay leader	3	3.00	3	3.00	6	3.00
	Total	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

Table 8: Source of information of soil health card holders

n=200

S.No.	Social of information	Mavli		Vallabhnagar		Total	
		f	%	f	%	f	%
1.	Personal sources	43	43.00	56	56.00	99	49.50
2.	Print media	18	18.00	10	10.00	28	14.00
3.	Electronic media	39	39.00	34	34.00	73	36.50
	Total	**100**	**100**	**100**	**100**	**200**	**100**

f= frequency, %=per cent

CONCLUSION

The study concluded that respondent farmers belonged to medium socio-economic status in general. They fall in middle income group with small and marginal size of land holding. Majority of farmers belonged to nuclear type of family, membership in one organization of social participation group, personal source as a source of information and fifty five per cent soil health card holders belonged to small size of family.

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SUGGESTIONS OF WOMEN SHG MEMBERS FOR EFFECTIVE AND PROFITABLE IMPLEMENTATION OF SHG ACTIVITIES

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ABSTRACT

The research work was performed in Udaipur district of Rajasthan state. Among the 17 tehsils of Udaipur district Rishabhdev and Kherwara tehsils were selected as they are having highest number of SHG. Total 20 SHG from 2 selected tehsils and 6 farm women from each SHG mean selected. Thus, total 120 farm women were selected for proposed study. For data collection, face to face interview technique was opted. The frequency and percentage were used to classify the respondents with respect to independent variables. Also, Mean Percentage Score, Ranking, Arithmetic mean, and Standard deviation were also calculated for the present study.

INTRODUCTION

Women constitute half the world's population. She contributes about two-thirds of its working hours, receive one-tenth of the world's income and own less than one-hundredth of the world's property (Gupta & Bapin Kumar Gupta, 1987).

As per 2020 census the total Indian population was 1.35 billion, of which women amounted to 65.3 crore. Consequently women inaugurate 50% of the inhabitants, overall work two third part of work is performed by women population and generate 50 percent of sustenance engrossed by the nation, they gain one third of stipend and concede 10 percent of the resources or affluence of the nation. (Reddy *et al*. 1994).

A self-help Group is a voluntary association of persons with common interests, formed and managed democratically without any political affiliation (Ramesh,1996).

SHG is not a static institution. It enlarges on sources and administrative adroitness of its members and their growing credence to acquire involved in issuance and plans that needs their participation in the public and private sectors. The appendages are automatically empowered economically, politically and socially in an entire path for developing their own institution for common benefit through SHGs.

SHG is not a new concept in development. Studies have shown that savings through thrift and credit has been one of the important activities of such groups and becoming very popular among the poor particularly among women in the rural areas (Kumaran,1997). The money thus saved is used not only for meeting their emergent consumption needs but also for income generating activities (Rao,1994; Harper,1996).

RESEARCH METHODOLOGY

The current study was taken over in udaipur district. The two constituent tehsils of udaipur randomly selected i.e. Rishabhdev and kherwara for the present study, based on the higher strength of respondents. Two Gram Panchayat were selected randomly from each tehsil and each Gram panchayat 30 farm women selected for the study. Overall, 120 respondents were selected from both the tehsil. The respondent was interrogated and gathered the data based on the prepared interview schedule based on specific objective. The gathered data was refined, tabulated, analysed and interference were made in accordance with objective.

RESULTS AND DISCUSSION

First section of table 1 indicates personal suggestions from women SHG members. "Women should be educated", "Full support of family member" ranked first with overall 100.00 MPS,

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Table 1: Allocation of farm women on the basis of suggestions from women SHG members (n=120)

S. No.	Suggestions	Rishabhdev Tehsil MPS	Rank	Kherwara Tehsil MPS	Rank	Total MPS	Rank
A.	**Personal Suggestions**						
1	Women should be educated	100.00	I	100.00	I	100.00	I
2	Enthusiasm to SHG	90.00	III	70.00	V	80.00	IV
3	Good handle of leadership, problem solving and conflict	96.67	II	88.33	IV	92.50	II
4	Regular in evaluation and monitoring of SHG	78.33	V	93.33	III	85.83	III
5	SHG should extend the area of their business	86.67	IV	98.33	II	92.50	II
6	Full support of family member	100.00	I	100.00	I	100.00	I
B.	**Social suggestions**						
1	Good mutual understanding amongst SHG members	100.00	I	100.00	I	100.00	I
2	Similar nature in member of SHGs	88.33	III	73.33	III	80.83	III
3	Adjustable number of members in SHG should be present	100.00	I	100.00	I	100.00	I
4	Meeting on regular basis	91.67	II	61.67	V	76.67	IV
5	Fair right to every member in SHGs group	100.00	I	100.00	I	100.00	I
6	More official positions of schedule caste women are required to be provided and also for other categories	100.00	I	100.00	I	100.00	I
7	Investigations, analyzment of factors responsible for poor performance of SHGs	100.00	I	100.00	I	100.00	I
8	Ability of group to address local development needs/issues should be enhanced	100.00	I	100.00	I	100.00	I
9	Training program should be conducted on regular basis	75.00	V	68.33	IV	71.67	V
10	Efforts should be made to provide marketing facilities	100.00	I	100.00	I	100.00	I

11	Support from promoting agencies should be appropriate	100.00	I	100.00	I	100.00	I
12	Interference of male should not be in women SHG	100.00	I	100.00	I	100.00	I
13	Equal status in society	83.33	IV	91.67	II	87.50	II
14	Women should have right to take decision	100.00	I	100.00	I	100.00	I
C.	**Financial suggestion**						
1	Cooperation from financing bank	100.00	I	100.00	I	100.00	I
2	Fluidity in loan sharing	75.00	II	81.67	III	78.33	II
3	Honest money transaction should be done by savings	100.00	I	100.00	I	100.00	I
4	Further development should be done by savings	71.67	III	85.00	II	78.33	II
5	Encourage more savings	100.00	I	100.00	I	100.00	I
6	Punishment for nonrepayment of loan	70.00	IV	63.33	IV	66.67	III
7	Easy bank loaning procedure	100.00	I	100.00	I	100.00	I
D.	**Managerial suggestions**						
1	Member should present timely in meeting	100.00	I	100.00	I	100.00	I
2	Member should trust on each other	100.00	I	100.00	I	100.00	I
3	Coordination is must among the member	100.00	I	100.00	I	100.00	I
4	Group member should have common needs and object	85.00	II	78.33	II	81.67	II

MPS = Mean Percent Score

where as both the tehsils ranked first, in Rishabhdev and Kherwara it was 100.00 & 100.00 MPS. The reason was behind this was these suggestions were positive and are in greater need for improvement of SHGs. "Enthusiasm to SHG" ranked fourth with overall 80.00 MPS, whereas Rishabhdev tehsil ranked third with 90.00 MPS and Kherwara tehsil ranked fifth with 70.00 MPS. Reason behind this maybe it is necessary for the women members to have the spirit and enthusiasm to reduce the spontaneous copy, due to which they will get the benefits from the SHG and their social, economic status will improve.

Second section of Table 1 indicates social suggestions from women SHG members. "Good mutual understanding amongst SHG members", "Adjustable number of members in SHG should be present", "Fair right to every member in SHG group", "More official positions of schedule caste women are required to be provided and also for

other categories", "Investigations, analyzement of factors responsible for poor performance of SHGs", "Ability of group to address local development need/ issues should be enhanced", " Efforts should be made to provide marketing facilities", " Support from promoting agencies should be appropriate", "Interference of male should not be in women SHG", "Women should have right to take decision" were ranked first with overall 100.00 MPS where both the tehsils ranked them first with 100.00 MPS. The reason behind this was these suggestions were positive and are in greater need for improvement of SHGs. "Meeting on regular basis" ranked fourth with overall 76.67 MPS where rishabhdev tehsil ranked it second with 91.67 MPS and kherwara tehsil ranked it fifth with 61.67 MPS. Probable reason behind this might be their new ideas will be revealed and their abilities, learning ability will increase. "Training programme should be conducted on regular basis" The reason behind this was being a meeting regular will increase their knowledge, skills, abilities.

Third section of the Table 1 depicts the financial suggestions from women SHG members. "Cooperation from financing bank", "Honest money transaction done by savings", "Encourage more savings", "Easy bank loaning procedure" ranked first with overall 100.00 MPS where both the tehsils Rishabhdev and Kherwara ranked first with 100.00 MPS. The reason behind this was overcome the financial constraints because marketing and finance is very important area of the SHGs. "Punishment for non-repayment of loan" ranked third with overall 66.67 MPS where rishabhdev tehsil ranked it fourth with 70.00 MPS and kherwara tehsil ranked it fourth with 63.33 MPS it that their should be a particular punishment assign to every mistake done by any of SHG member during she is knowing that mistake is being done by her.

Fourth section of Table 1 indicates managerial suggestions from women SHG members. "Member should present timely in meeting" ranked first with overall 100.00 MPS where both the tehsil ranked first with overall 100.00 MPS. Possible reason was there by this, a conscious will remain and the dignity of the SHG will be maintained and early training, meeting will give more time to learn. "Group members should have common needs and objects" ranked second with overall 81.67 MPS whereas, Rishabhdev tehsil ranked it second with 85.00 MPS and Kherwara tehsil ranked it second with 78.33 MPS. Possible reason was there should a common demand from every group member so that it could be fulfilled easily and fast.

CONCLUSION

1. There was majority of respondents who suggested that women should be educated with the MPS of 100.00 and other suggestions like "Full support from family members" with 100.00 MPS.
2. Some of the suggestions were in medium place i.e. "Good handle of leadership, problem solving and conflict", "SHG should extend the area of their business", "Similar nature in member of SHG" with the MPS of 92.50 to 80.83, respectively.
3. There was very less difference present in the suggestions from the women SHG members of both the tehsil.

Suggestions and recommendations

1. Given awareness towards health education, social affairs, child marriage, dowry, widow pension.
2. There is a need of skill enhancement and communication skills.
3. Given a good education and social support to women SHG member.
4. The cost of production should be less so that the women SHG members get good financial support.
5. Money required for entrepreneur should be less.
6. Banks should work on their returning of loan and getting of loan for an easy access.
7. There is difficulty in commodity marketing which should be reduced by financially supporting them.
8. Family members cooperate very less and this is

a big problem which should be look after.

9. Areas with backward status should get awareness about government programmes and SHG activities.

10. There should also given skill guidance to involve in micro or small scale business for empowerment of women which will led the nation on high peak.

11. Behaviour of financial organization also play vital role in improving the group related constraints and that should be managed properly by the leaders.

12. Training programmes, bank support, sale products are some areas where is some need of attention to improve the business.

13. Government should also support women's for their excellent behaviour, work and other capability to make them achieve more and empower themselves.

14. The thing of casting, male superiority should not be present at any cost as it is a great hindrance in development.

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INCOME GENERATION THROUGH SHGs IN PRAYAGRAJ DISTRICT OF UTTAR PRADESH

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ABSTRACT

Women's empowerment is a much debated topic, which has many aspects to it. It is not only multidimensional in approach, but also helps one understand that when women are empowered, they gain self confidence and actualize their own power and capabilities. Self-empowerment makes women more aware of their erstwhile hidden potential and qualities and offer requisite opportunities for self-development and progress in socio-economic spheres in life. As we know, empowerment not only changes one's ideas and perceptions, it also helps create awareness about one's rights. As far as the employment of women is concerned, the women Self-Help Groups (SHGs) in India have been duly recognized as an effective means for empowerment of women in rural as well as in urban areas. SHGs have also brought women together from all spheres of life, helped them speak for themselves and fight for their rights wherever needed. The present paper focuses on the importance of SHGs in the lives of rural women. The study for the same was conducted in selected villages of Prayagraj district of Uttar Pradesh, India. The study revealed that women have become more authoritative socially and cost-effectively yet there is still the scope of upgrading with respect to Political empowerment. The members of SHGs have more confident and independent decision makers to a considerable extent due to joining SHGs.

INTRODUCTION

In India three different models of linkage of SHGs to the financial institutions have emerged. They are: Banks, themselves, form and finance the SHGs. SHGs are formed by NGOs and other agencies but financed by banks. Banks finance SHGs with NGOs and other agencies as financial intermediaries. The second model is the most popular model. Almost three-fourths of all the SHGs come under this model. Only 20% of the SHGs are covered under the first and 8% under the third model respectively. The fundamental aim of promoting SHGs is poverty alleviation and to achieve empowerment of women. The recent trends show significant changes in the promotional strategies for the SHGs. Financial needs like banking, saving, insurance etc, getting subsidies, building organizations to gain political power also, are the purposes behind some of the SHGs.

Today like Bangladesh & India, SHG movement is spreading in other Asian Countries and Latin America, Africa etc. SHG movement has got importance in the social movement. This year the Central Government of India has announced a plan to promote 7 lakh SHGs, all over the country. The State Government of Uttar Pradesh has also announced to promote 5 lakh SHGs within next 2 years. The study is likely to provide valuable information on the socio-economic and educational status of the members and non-members of SHG, motivating factors for the formation of SHGs, difference in the level of empowerment of members and non-members by comparing their social, economic, and educational background. The finding could serve as a guideline in formulating further policies and programmes related to women empowerment. There has not been sufficient number of studies in this particular area. Hence, the present study aims to study the problems of members and non-members and explains how SHG is a tool of poverty alleviation and tries to explore suggestions for sustainable empowerment of women.

RESEARCH METHODOLOGY

The present study was conducted in purposely

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selected district of Prayagraj. One block namely Chaka was selected for the selection of respondents. 6 village panchayat were selected from the block. The villages were selected proportionately where SHGs were more in number. From each village, approximately 20 respondents were selected proportionately making the total size of 120 respondents.

RESULTS AND DISCUSSION

SHG schemes have been extensively used by NGOs over a long period of time to increase the level of awareness of such programmes among the rural poor. It not only includes awareness about the existence of the group and the various benefits through such groups but also includes creating awareness about self employment, savings, health, education and family welfare thereby making these women more empowered.

One of the main reasons for women joining SHGs is because by undertaking activities through these groups, they earn a steady source of income. For some women this is the only source of their livelihood, whereas for others it is an additional source of income. In order to study the effects of income after joining SHGs, the researchers have formulated the following hypothes is and put to test using Paired t-Test.

NH_0: There is no significant increase in income of women after joining SHGs

RH_1: There is significant increase in income of women after joining SHGs

The standard p-value of 0.05 and the tabulated p-value is 0.000 which is less than standard value (Table 2). Thus, we can reject null hypothesis and state that there is a significant increase in the income of the women after joining SHGs. By taking up income generating activities through SHGs, the rural women in the two districts have seen a rise in their income. Increased income means more money and improvement in the standard of living of the women and their family which ultimately leads to empowerment of the women in these rural areas.

We can conclude that there was a significant increase in the rate of employment of women after joining SHGs. Over ninety per cent of the women have agreed that their standard of living has improved after joining the SHGs. Some of the women also said that they feel empowered not only economically but also socially. They have more self-esteem and know more about the issues happening around the world.

CONCLUSION

The core SHG philosophy is in women

Table 1: Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Income before joining SHG	1.33	120	0.840	0.049
Income after joining SHG	1.78	120	1.428	0.084

Table 2: Paired Samples Test

Particular	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% confidence interval of the difference		't'	df	Sig (2-tailed)
				Lower	Upper			
Income before joining SHG - Income after joining SHG	-.457	1.057	.062	-.579	-.334	-7.347	288	0.000

empowerment through increasing employability, self-sufficiency and inculcating a habit of saving among the rural women. Empowerment in micro-credit will inevitably involve a significant change in attitude, change in work practices and challenging vested interests. For women's empowerment to be addressed, women need to be enabled to define their priorities and demand their rights. Women have agreed that their standard of living has improved after joining the SHGs Micro finance can be an effective strategic instrument for poverty alleviation only if it used for income generating microenterprise development. As per the research, Self Help groups are successful in rural areas, especially among women. These programs have uplifted the rural woman economically and socially in the society. Women are an integral part of the economic development of the country; therefore the government should give equal importance to the women contributors and their well-being in the society

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FACTORS INFLUENCING ADOPTION OF RECOMMENDED MUGA REARING PRACTICES IN ASSAM

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ABSTRACT

Muga, "the golden fibre" is produced only in Assam. Muga silk industry occupies a unique place in socio economic and cultural aspects of rural people in Assam. The growing demand of muga in global market realises the need to augment its production. Despite of suitable climatic and ecological conditions for muga rearing, the golden silk production is not at par with its demand. Adoption of improved muga rearing practices is essential to enhance its productivity. The study focussed on identifying those factors that influence rate of adoption. The findings indicated a medium level of overall adoption (69.17%) by the rearers which was followed by low (17.50%), while 13.33 per cent had high level of adoption level. The variables namely age, farming experience, total land holding, area under muga, total annual income, income from muga, extension contact, risk bearing ability and decision making ability showed a positive and significant relationship with overall adoption level. However, farm labour availability, information source utilization, marketing orientation exhibited a non-significant relationship with adoption level. All the selected variables were found to contribute 71.4 per cent of total variation towards adoption (R2=0714) but significant contribution was recorded for only four variables namely age, farm experience, extension contact, and decision making ability.

INTRODUCTION

India occupies a unique position being the only country in the world to produce all four types of silk i.e. mulberry, eri, tassar and muga silk. Our country is the second largest silk producing country in the world next to China contributing about 18 per cent to the global production. Sericulture has become one of most potential agro based industries providing ample scope for employment throughout the year. Karnataka is the leading State in the production of raw silk (8,483 metric tons) followed by Andhra Pradesh (5,520 metric tons) and Assam occupies third position producing 5,038 metric tons during 2021 (Central Silk Board, 2021).

Assam is bestowed with suitable soil texture and congenial climatic conditions that favours the growth and development of all four types of silk. Among these, muga, the "golden fibre" (Antheraea assamensis) is produced widely in Assam which is closely associated with the rich heritage of Assamese culture and socio economic life of rural masses. Muga silk is native to Assam and other neighboring North Eastern States and it received Geographical Indication (GI) status in 2007 for Assam. Assam alone contributes about 95 percent of country's total muga production. (Directorate of Sericulture, handloom Textiles & Sericulture; Government of Assam, 2022). Lakhimpur district of Assam is traditionally a muga rearing hub having about 1385.80 ha area under muga with 2 muga seed farms and 3 muga reeling units. Around 7,571 families are engaged in muga rearing producing 675 lakhs of muga cocoons and raw muga silk of 13,500 kg during 2015-16. (Statistical handbook of Assam, 2016).

Muga industry holds a distinct position in the economy of the region as about 1.28 lakh families of Assam are engaged in rearing and production of muga silk. The statistical data shows that Assam produced 142 MT, 139 MT and 157 MT during 2015-16, 2016-17 and 2017-18 respectively (PIB, 2018). Although there has been a steady increasing trend in muga raw silk production but is still behind

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the potential production of 200 MT (Choudhury *et al.*, 2016). Its requirement in domestic and international market is not sufficient to meet the demands of customer. The yield gap between the demonstration centre and the farmers is 50% in seed and 30% in commercial crop as reported by Baaruah *et al.*, 2004.

Therefore, to mitigate the gap, it felt necessary on the part of rearers to adopt improved muga rearing practices, but often they stick to their own traditional method. Mech *et al.* (2004) reported that low adoption of recommended technologies resulted in the production of 20-40 cocoons as against 50-60 cocoons per laying. Besides several factors, socio economic profile characters of muga rearers are the underlying factors that may influence the adoption of recommended muga rearing practices. Considering the above facts, the paper attempts to throw light on: (i) To identify the socio economic profile characters of muga rearers and (ii) To determine correlation between socio economic profile of rearers and adoption of recommended muga rearing practices

RESEARCH METHODOLOGY

The present study was carried out purposely in Lakhimpur district of Assam as it is one of the leading districts in muga silk production and has greater potential for muga rearing. Out of seven development blocks in the district, six blocks were selected purposively based on the prevalence of higher number of muga rearers population and from each selected block, one village was selected randomly constituting a total of 6 villages. Twenty respondents having minimum five years of muga rearing experience from each village was selected which makes a sample size of 120 respondents. The nature of study was ex-post facto research which was conducted during October 2020. Personal interview method was employed to collect primary information using a structured schedule. A set of eighteen independent variables were selected to measure socio economic and psychological profile of the respondents along with a dependent variable i.e. Extent of adoption which in turn was measured in a three point continuum as full adoption (if all recommended practices were adopted), partial adoption (if a few recommended practices were adopted) and no adoption (if not a single recommended practices were adopted) with a score of 2, 1 and 0 respectively. To assess the overall adoption of the respondents a total of 38 recommended muga rearing practices were included in consultation with Central Silk Board and Sericulture department, Assam. Adoption level of the respondents was grouped into three categories as low, medium and high based on Mean ± SD. The collected data were properly tabulated and analyzed with the help of suitable statistical techniques such as frequency, percentage, Mean, Standard deviation, correlation coefficient and regression.

RESULTS AND DISCUSSION

Socio economic profile of muga reares:

Distribution of respondents according to their socio economic profile characters (independent variables) and overall level of adoption (dependent variable) are depicted in Table1. As indicated in table1, large percentage (85.00%) of muga rearers belonged to the age group of 35 to 56 years having more work efficiency. Educational level was not considerable as (40.83%) were high school passed, only 7.50% were graduate and 2.50% were illiterate. Most (59.16%) of them preferred to reside in joint families and (76.66%) had 4 to 8 family members. 64.17 per cent depend on muga and other agricultural activities as the main family occupation, while only 5.83% were solely dependent on muga rearing. More than half (53.33%) of them had 10 to 20 years of muga farming experience and mostly (85.83%) used only family labour for its farming. Majority (52.50%) of them were marginal land holder possessing up to 1 ha of land and 92 per cent of them utilized less than 0.7 ha area under muga rearing. The total annual income ranges in between Rs. 61,000 to Rs. 2,76,000 for 69.17 per cent of respondents, while 65.83% of them earned an annual income of Rs. 36,000 to Rs. 1,54,000 from muga rearing. About 50.83% used to sell value

Table 1: Distribution of respondents according to their selected socio-personal, socio-economic and psychological characteristics of the respondents

(n=120)

(A) Independent variables	Category	F (%)	Mean	S.D.
Age	< 35 years	21(17.50)	45.64	9.61
	35-56 years	85 (70.80)		
	> 56 years	14 (11.66)		
Educational level	Illiterate	3 (2.50)		
	Up to Middle school passed	39(32.50)		
	High school passed	49 (40.83)		
	Higher secondary passed	9(16.67)		
	Graduate	2(7.50)		
Family type	Nuclear	49 (40.83)		
	Joint	71 (59.16)		
Family size	Small (<5 members)	15 (12.50)	5.64	1.86
	Medium (5-8 members)	92 (76.66)		
	Large (>8 members)	13 (10.83)		
Occupation of family	Only muga farming	7 (5.83)		
	Muga + allied agriculture	77 (64.17)		
	Muga+ service	13 (10.83)		
	Mandarin +other activities	23(19.17)		
Farming experience	Low (<10 years)	37 (30.83)	13.78	6.02
	Medium (10-20 years)	64 (53.33)		
	High (>20 years)	19 (15.83)		
Farm labour availability	Family labour	103 (85.83)		
	Hired labour	0 (0.00)		
Total land holding	Marginal (up to 1 ha)	63 (52.50)	1.29	1.10
	Small (1.1 to 2 ha)	38 (31.66)		
	Semi medium (2.1 to 4 ha)	14 (11.66)		
	Medium (4 to 10 ha)	5 (4.16)		
	Large (Above 10 ha)	0(0.00)		
Area under muga	Low (<0.7ha)	92 (76.66)	4.62	1.83
	Medium (0.7-0.93 ha)	27 (22.50)		
	High (>0.93 ha)	1(0.83)		
Total annual income	Low (Below Rs. 61,000)	11 (9.17)	1,68,595	1,07,591
	Medium (Rs. 61,000- 2,76,000	83 (69.17		
	High (Above Rs. 2,76,000	26 (21.67		
Annual income from muga	Below Rs. 36,000	4 (3.33)	95,428	59,274
	Rs. 36,000- 1,54,000	79 (65.83)		
	Above 1,54,000	37 (30.83)		
Nature of product sale	Seed cocoon	26 (21.67)		
	Raw silk	33 (27.50)		
	Value added products	61 (50.83)		

Extension contact	Low (Below 6)	19 (15.83)	9.11	3.24
	Medium (6-12)	88 (73.33)		
	High (Above 12)	13 (10.83)		
Training exposure	No training	77 (64.17)		
	Training	43 (35.83)		
Social orientation	Low (Below 3.54)	29 (38.67)	4.73	1.19
	Medium (3.54-5.92)	40 (53.33)		
	High (Above 5.92)	9 (12.00)		
Marketing orientation	Low (Below 17)	19(15.83)	21.36	3.85
	Medium (17-25)	88 (73.33)		
	High (Above 25)	13 (10.83)		
Risk bearing ability	Low (Below 14)	10 (8.33)	15.85	1.13
	Medium (14-17)	81 (67.50)		
	High (Above 17)	29(24.17)		
Decision making ability	Low (Below 10)	16 (13.33)	13.59	3.47
	Medium (10-17)	74 (61.67)		
	High (Above 17)	30 (25.00)		
(B) Dependent variable				
Adoption level of recommended muga rearing practices	Low (below 46)	21 (17.50)	51.06	5.46
	Medium (46-56)	83 (69.17)		
	High (Above 56)	16 (13.33)		

added products of muga. Most (73.33%) of them had medium level of extension contact, while only 35.83% had training exposure. Also a medium level of social orientation (53.33%), marketing orientation (73.33%), risk bearing ability (67.50%) and decision making ability were observed in the study.

From the Table1, it was also observed that majority (69.17%) of muga rearers exhibited medium level of adoption. This was followed by low adoption level (17.50%), while 13.33 per cent only belonged to high level of adoption category. The probable reasons might be due to the fact that muga rearing has been traditionally practiced in the area since ages and the rearers would not have realized the importance of commercialization. Some other reasons might be less back up support from various extension sources and poor knowledge, requisite skills on scientific muga rearing. Another important possible reason was that as majority of respondents were small and marginal farmers, it became difficult on their part to afford various costs incurred in improved rearing practices. The findings are in conformity with the results of Verma *et al.* (2011) and Sonowal *et al.* (2019).

Correlation and multiple regression of selected profile characters of muga rearers with extent of adoption:

Table 2 depicts the relationship between selected independent variables and their combined effect with dependent variable. Here, the overall adoption level of the respondents was taken into consideration. To assess the relationship, Karl Pearson's product-moment coefficient of correlation was used and regression analysis was done to determine the combined effect of selected independent variables on the dependent variable. Further, significance of correlation was calculated with the help of t-test.

Out of thirteen selected independent variables, nine of these namely age (r= 0.522**) , farming experience(r= 0.469**), total land holding (r= 0.194*) , area under muga (r= 0.183*), total annual income (r= 0.311**), income from muga (r= 0.431**), extension contact (r= 0.515**), risk bearing ability(r= 0.196*) and decision making ability (r= 0.362**) exhibited a positive and

Table 2: Correlation coefficient and multiple regression of selected profile characters of respondents with extent of adoption

Variables	(r value)	(B value)	t value	R2
Age	0.522**	1.709**	4.216	
Family size	-0.098	-0.637	-0.877	
Farming experience	0.469**	1.979**	3.459	
Farm labour availability	0.141	0.271	0.387	
Total land holding	0.194*	-1.728	-1.692	
Area under muga	0.183*	-1.455	-1.382	
Total Annual income	0.311**	0.294	0.589	0.714
Annual income from muga	0.431**	0.0007	0.745	
Extension contact	0.515**	2.627**	2.742	
Social orientation	-0.087	-0.585	-0.744	
Marketing orientation	0.147	0.28	0.511	
Risk bearing ability	0.196*	0.622	1.732	
Decision making ability	0.362**	2.158*	2.544	

** Significant at 0.05 level of probability; * Significant at 0.01 level of probability

significant relationship with adoption level which reflects that any positive increase of these variables will lead to more adoption of recommended muga rearing practices by the respondents. While, farm labour availability, marketing orientation were not correlated with adoption. Moreover, variables such as family size, social orientation were very weak and did not show any correlation with adoption of recommended muga rearing practices.

Looking at the relationship scenario of independent variables with dependent variable (Table 2), it can be interpreted that with increase in age rearers would be experienced enough to judge advantages of improved technology and able to take right decision in adoption. The finding was similar with the findings of Chakravoty *et al.*, 2015. Farmers having more years of experience in muga culture could compare their own wisdom of knowledge and yielding benefit of improved practices which influence them to adopt technology. Farmers with more land holding would take chance of risk in allotting a portion for any recommended technology. More the area under muga farming, more numbers of som plants could be accommodated and in few could take challenges in adopting improved technology which is supported by work of Goswami *et al.*, 2015. With increase in income help to develop their confidence in incurring all requisite expenditures for its adoption. Similar finding was also reported by Kumar *et al.*, 2018. Similarly, if more income could be generated from its culture, then rearers would be encouraged and dreamt for commercialization for which they might think to go for improved technology. Regular extension contact helped to get support and enriching their knowledge which would influence them to adopt and the finding is in conformity with Mech *et al.*, 2016. Farmers possessing more risk able to bear all challenges in introduction of any new technology. Decision making power helped to implement the idea keeping aside all fickle minded thoughts. Therefore, increase in decision making ability would result in increase in adoption and the finding is in line with Mech ,V. and Mech, D. (2020).

Table 2 also reveals the exact idea about how much contribution (variation) were made by these nine variables (age, farming experience, total land holding, area under muga , total annual income, income from muga, extension contact, risk bearing ability and decision making ability) in total changes in the dependent variable. The multiple regression with all the 13 predictors produced R2 = 0.714. The R2 value 0.714 clearly signifies that these independent variables taken together could explain

71.4 per cent of total variation in respondent's extent of adoption. The findings indicated that 28.60 per cent of variations in the dependent variable remained unexplained. Here only age, farming experience, extension contact, and decision making ability were found to have significant contribution to the total variation in adoption. The other variables also might have some contribution but they were negligible and were not significant enough.

CONCLUSION

Muga silk industry is a prestigious rural based industry of Assam as it plays an indispensable role in socio economic lives of rural people. Inspite of tremendous potentiality, its production and productivity is not up to the mark that can fulfil the demand in the market. With the advancement of science and technology it is desirable that traditional muga rearing practices needs to be shifted to modern way of rearing. But the study showed that still they are not adopting recommended technologies to the fullest level. Their socio economic characteristics are influencing in adoption as certain profile characters were found to have significant relationship with adoption. Thus, while advocating any improved technology, concerned departments should gain thorough understanding of characteristics of rearers so that technology fit best to their socio economic conditions. To facilitate easy adoption all kinds of hand holding support are to be provided. Muga, the pride of Assam can be taken to a significant height provided government, scientists, extensionists and people work together to reap the benefit.

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OPINION OF BENEFICIARIES OF NAIP TOWARDS HIGH YIELDING VARIETIES AND IRRIGATION WATER MANAGEMENT IN WHEAT CULTIVATION

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ABSTRACT

In Rajasthan, NAIP was in operation in four tribal populated districts namely, Udaipur, Banswara, Dungarpur and Sirohi. Therefore, district Banswara was selected for present investigation based on maximum households covered under the project. Out of Talwara and Garhi Panchayat Samities, Talwara was selected for the study. Total size of sample was of 76 respondents for the present study.

The findings revealed that majority of the respondent i.e. 31 (40.78 per cent) beneficiaries had moderately favourable opinion, followed by 29 (38.16 per cent) beneficiaries were from highly favourable opinion group and 16 (21.06 per cent) had less favourable opinion about high yielding varieties. Study further revealed that 60 (78.95 per cent) beneficiaries were from highly favourable opinion category, followed by 12 (15.79 per cent) beneficiaries were from moderately favourable opinion group and 4 (5.26 per cent) beneficiaries had less favourable opinion about Irrigation Water Management (IWM) practices of wheat.

INTRODUCATION

Shri Sharad Pawar, Union Agriculture Minister, on July 2006, launched a 6 year ambitious agricultural research Programme, National Agricultural Innovation Project (NAIP), which focuses on innovations in agricultural technology. It would facilitate an accelerated and sustainable transformation of the Indian Agriculture so that it can support poverty alleviation and income generation. The total budget of NAIP was of US $ 250 million; the World Bank has funded US $ 200 million as credit, mostly interest free and a part with negligible interest and US $ 50 million was borne by the Government of India. The recently concluded National Agricultural Technology Project (NATP) led by the ICAR, aimed to implement the shared understanding of the Government of India and the World Bank on technology- led - pro - poor growth, and it facilitated the public sector reform process for accelerating the flow of agricultural technologies. A key lesson from the NATP is that deliberate investments in partnership building and shared governance are required to speed up technology adaptation and dissemination. Various Agricultural Universities in India have been provided with sufficient fund by the ICAR to implement different programmes for increasing income and nutrition through adoption of economically viable integrated farming system. Under component 3 of NAIP, Maharana Pratap University of Agriculture and Technology, Udaipur had also been sanctioned a consortia project entitled "Livelihood and nutritional security of Tribal dominated areas through integrated farming system and technology modules". Good efforts under the project are being made to replace local seeds of wheat with High Yielding Varieties, along with important interventions, such as Integrated Nutrient Management (INM), Integrated Pest Management (IPM) and Integrated Water Management (IWM).

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RESEARCH METHODOLOGY

The investigation was conducted in Talwara Panchayat Samiti of Banswara district of southern Rajasthan. With the specific objective to evaluate the NAIP with special reference to HYVs and IWM of Wheat cultivation. It was performed based on comparison of beneficiaries with those of non-beneficiaries with regard to their opinion level of HYVs and IWM of Wheat cultivation. Out of total 52 Gram Panchayats under Talwara Panchayat Samiti, four Gram Panchayats *viz*., Masotiya, Devlia, Sageta and Jhalo ka Gada (Nokla) were covered under NAIP. Therefore, as such, these four Gram Panchayats were included in the present investigation. Headquarters (villages) of Gram Panchayats were treated as selected villages for the study. Hence, Masotiya, Devlia, Sageta and Jhalo ka Gada (Nokla) were the villages where from required sample size of beneficiaries respondents was drawn. Total seventy six beneficiaries were selected for the present study. Total size of sample was of 76 respondents. Relevant data were collected from the selected respondents with the help of constructed interview schedule. Face -to - face interview technique was employed for collecting the data from the respondents. Thereafter, data were analyzed and results were interpreted in the light of the objective of study.

RESULTS AND DISCUSSION

1. Level of opinion regarding high yielding varieties (HYVs)

To get an overview of the farmers regarding their opinion towards high yielding varieties, they were classified into three categories i.e., less favourable, moderately favourable and highly favourable on the basis of calculated mean per cent score of the opinion obtained by them.

Data presented in Table 1 visualize that 31 (40.78 per cent) beneficiaries had moderately favourable opinion, followed by 29 (38.16 per cent) beneficiaries were from highly favourable opinion group and 16 (21.06 per cent) had less favourable opinion about high yielding varieties of wheat crop.

Thus, from the above finding, it may be concluded that respondents showed high to moderate favourable opinion towards use of HYVs in wheat. More clearly, the results indicated positive impact of NAIP because the beneficiaries expressed good views and liking towards HYVs of wheat.

Table 1: Distribution of beneficiaries according to their level of opinion regarding high yielding varieties (HYVs)

n=76

S. No.	Level of opinion	frequency (f)	percent (%)
1	Less favourable (upto-33 score)	16	21.06
2	Moderately favourable (34-66 score)	31	40.78
3	Highly favourable (Above 66 score)	29	38.16
	Total	**76**	**100**

f=Frequency

As per the findings of opinion it is recommended that the NAIP project in study area should go on with the existing pace with regards to use of HYVs of wheat (Raj-3077, Raj-3765, Raj-4037 and GW-273) by the farmers.

The findings of the present study are in agreement with the findings of Khajuria *et al.* (2000).

2. Level of opinion regarding Irrigation Water Management (IWM) practices of wheat

To get an overview of the farmers regarding their opinion towards irrigation water management, they were classified into three categories i.e., less favourable, moderately favourable and highly favourable on the basis of calculated mean per cent score of the opinion obtained by them.

Data presented in Table 2 visualize that 60 (78.95 per cent) beneficiaries were from highly favourable opinion category, followed by 12 (15.79 per cent) beneficiaries were from moderately favourable opinion group and 4 (5.26 per cent) beneficiaries had less favourable opinion about Irrigation Water Management (IWM) practices of wheat.

Thus, from the above finding, it may be

Table 2: Distribution of beneficiaries according to their level of opinion regarding Irrigation Water Management (IWM) practices of wheat

n=76

S. No.	Level of opinion	Frequency (f)
1	Less favourable (upto 33 score)	4 (5.26)
2	Moderately favourable (34-66 score)	12 (15.79)
3	Highly favourable (Above 66 score)	60 (78.95)
	Total	**76 (100)**

f=Frequency

concluded that respondents showed highly favourable opinion towards use of IWM in wheat. Moreover, it is inferred that the water is the most precious input for wheat crop and beneficiaries of the study area expectedly visualized highly favourable towards the interventions suggested under NAIP. Therefore, it is suggested that the same interventions must be continued because these reflected positive impact

The findings are conformity with the findings of Jat (2003).

Table 3: Aspects wise opinion of the beneficiaries regarding HYVs of wheat

n=76

S. No.	Aspect	MPS	Rank
1.	Easily availability	88.25	IV
2.	Low cost	87.05	V
3.	Less labour intensive	70.21	X
4.	Input intensive	78.53	VIII
5.	Less susceptible to diseases and insect pests	77.05	IX
6.	Less lodging	89.46	III
7.	Short duration	90.50	II
8.	More remunthive	92.41	I
9.	Higher production	86.66	VI
10.	More market demand	80.73	VII

MPS=Mean Percent Score

3. Aspect wise opinion of the beneficiaries regarding HYVs of wheat

To know the in depth opinion of beneficiaries towards the different aspects of high yielding varieties of wheat in all 10 aspects were formulated, MPS for each aspect was calculated and ranked accordingly.

Data presented in Table 3 reveal that most of the beneficiaries were of opinion that HYVs are more remunthive with 92.41 MPS and ranked first. This was followed by qualities of HYVs as short duration which ranked II (MPS 90.50) and less lodging which ranked III (MPS 89.46).

The rank hierarchy of opinion about HYVs showed that almost all the aspects of HYVs obtained considerable MPS. It meant, beneficiaries were fully agreed and satisfied with the NAIP interventions regarding sub-aspects of HYVs. It indicates of fruitful impact of NAIP with respect to high yielding varieties of wheat.

4. Aspects wise opinion of the beneficiaries regarding IWM practices of wheat

To know the opinion of beneficiaries towards the different aspects of irrigation water management

Table 4: Aspects wise opinion of the beneficiaries regarding IWM practices of wheat

n =76

S. No.	Aspect	MPS	Rank
1.	Low cost	81.30	VIII
2.	Saves water	88.40	III
3.	Less input intensive	90.30	II
4.	Less labour intensive	87.51	IV
5.	Increases production	82.04	VII
6.	Saves fertilizers through fertigation	79.61	IX
7.	Decreases weeds' problem	91.20	I
8.	Conserves biodiversity	86.21	V
9.	Helps in ground water recharge	85.10	VI

MPS=Mean percent score

in wheat, all nine aspects were formulated. MPS for each aspects was calculated and ranked accordingly.

The opinion of the beneficiaries about the IWM was study and the data were presented in Table 4. Data show that beneficiaries were of opinion that IWM decrease weeds' problem with MPS 91.20 followed of IWM is less input intensive which ranked II with MPS 90.30. The next opinion was that IWM saves water. The last, but not the least, at ninth place farmers were in opinion that IWM saves fertilizers through fertigation with 79.61 MPS.

In view of the opinion of beneficiaries regarding different aspects of IWM in wheat, it is strongly recommended that IWM interventions, introduced and recommended for wheat cultivation in Talwara Panchayat Samiti of Banswara, should be carried on till the project ends. It is also recommended that same interventions of IWM can be introduced to the farmers for similar NAIP or other projects elsewhere.

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CONSTRAINTS PERCEIVED BY AGRICULTURE GRADUATES IN ACHIEVING OBJECTIVES OF RAWE UNDER STUDENT READY PROGRAMME

Priyanka Rana* and N.K. Punjabi**

ABSTRACT

The study was conducted in purposely selected Udaipur district of Rajasthan in the session 2020-21 .The School of Agricultural Sciences,Dabok a constituent college of Janardan Rai Nager Rajasthan Vidypeeth (deemed to be) university Udaipur was taken as a sample of academic institution for the study purpose. As many as eighty students who underwent RAWE training at Krishi Vigan Kendra Badgaon during the session 2020-21 were included in the study sample respondents. The data were collected by employing face o face personal interview with the help of structured schedule from the students. Missing control and poor monitoring of the programme by KVK staff was top ranked and most severe constraint in realizing the benefit of RAWE with MPS 95.33. Similarly poor response of VEW due to preoccupied work and heavy work season was second rank impediment as expressed by students in getting benefits of RAWE which score MPS 92.66. Widespread illiteracy and poverty in the villages was also causing serious concern to students in fulfilling the objectives of RAWE with third ranked constraint which scored MPS 90.

INTRODUCTION

Student READY (Rural Entrepreneurship Awareness Development Yojana) Programme is a new initiative of Indian Council of Agricultural Research to orient graduates of Agriculture for ensuring and assuring employability and develop entrepreneur for emerging knowledge intensive agriculture .The programme is run in all the agriculture universities as an essential pre-requisite for award of degree to ensure hands on experience and practical training considering the local demand. Out of the total five components of student's READY programme, Rural Agricultural Work Experience is an important aspect which helps the students primarily to understand the rural situation, status of technologies adopted by the farmers, prioritise the farmer's problems and to develop attitude and skills of working with farm families for overall development in rural areas.

A substantial period of time has passed since the programme was implemented in agricultural universities of the country. It is high time to assess the constraints encountered by agriculture graduates in meeting out the purpose of RAWE under the Yojana .Therefore, a present study was conducted to find out the constraints causing serious concern to agricultural graduates in realizing full benefits of the programme.

RESEARCH MEHODLOGY

The study was conducted in purposely selected Udaipur district of Rajasthan during academic session 2020-21. The School of Agricultural Sciences Dabok, a constituent college of Janardan Rai Nager Rajasthan Vidypeeth (deemed to be) university was taken as a sample of academic institution for the study purpose. As many as eighty students who underwent RAWE training at Krishi Vigan Kendra, Badgaon during the session 2020-21 were included in the study sample. The data were collected by employing face to face personnel personal interview technique with the help of structured schedule.

RESULTS & DISCUSSION

The data in Table 1 clearly indicate that missing control and poor monitoring of the programme by

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KVK staff was top ranked and most severe constraint in achieving the objectives of RAWE with MPS 95.33. Similarly poor response of VEWs due to pre-occupied work and heavy work season was second rank impediment as expressed by students in getting benefits of RAWE which score MPS 92.66. Widespread illiteracy and poverty in the village was also causing serious concern to students in fulfilling the objectives of RAWE placed at third rank constraint which scored MPS 90. It has been observed from the data that absence of full time instructor in the village to guide the students has defeated the very purpose of RAWE programme and placed at fourth rank in rank hierarchy .The respondents expressed that lack of follow-up visits by the instructor from parent institution was also realized as top ranked constraint with MPS 87.33.Likewise lack of diagnostic skills in identification and control measures of diseases in the field was also confronted the fair majority of the students in getting benefits of RAWE which was given sixth rank with MPS 86.66.Lack of knowledge about writing daily dairy and report in the practical manual supplied by the institution was also a problem to majority of the respondents with MPS 86.It was also observed that majority of students undergoing RAWE training (MPS 84.66) found it difficult to overcome language barrier that created problem in free interaction with allotted

Table 1: Constraints faced by Agricultural Graduates in achieving RAWE objectives

S.No.	Constraint	MPS	Rank
1	Absence of full time instructor in the village to guide the students	88.00	IV
2	Lack of rapport with the development functionaries in the village	78.00	XIV
3	Attachment with resource poor , and non cooperative farmers	81.00	XII
4	Lack of orientation about rural culture, and village life	82.66	X
5	Difficulty in getting safe accommodation in the village	80.00	XIII
6	Non cooperation of officials of basic village institutions	86.00	VII
7	Problem of medical help to students in emergency	80.00	XIII
8	Lack of diagnostic skills in identification and control measures of diseases	86.66	VI
9	Lack of follow up visits by instructors from parent institution	87.33	V
10	In sufficient knowledge of conducting face to face personal interview for data collection	83.33	IX
11	Lack of knowledge of writing daily dairy and report in practical manual	86.00	VII
12	Language barrier in free interaction with allotted family	84.66	VIII
13	Poor communication skills	75.66	XVII
14	Poor knowledge of latest agriculture development programs of GO and NGOs	66.00	XVIII
15	Poor response of VEWs due to pre-occupied work and heavy work season	92.66	II
16	Placement of students in villages with urban influence	81.77	XI
17	Lack of knowledge and information about basic problems of village and rural life	75.33	XVI
18	Lack of qualities of leadership and human relation skills	76.66	XV
19	Lack of knowledge of project formulation and farm plan preparation	76.66	XV
20	Missing control and poor monitoring of program by KVK	95.33	I
21	Insufficient knowledge of ITKs being practiced by farmers in the area	78.00	XIV
22	General problems of widespread illiteracy and poverty in the villages	90.00	III

MPS = Mean Percent Score

families .The constraints *viz*. insufficient knowledge for conducting face to face interview and lack of orientation of rural culture and village life was also perceived by majority of graduates which were accorded ninth and tenth rank with MPS 83.33 and 82.66, respectively .The other constraints in rank hierarchy were found to be ; placements of the students in villages with urban influence, attachment with resource poor and non cooperative farmers, difficulty in getting safe accommodation in the villages and lack of rapport with development functionaries in the village were also found constrainting the students in achieving the objectives of RAWE with relatively less magnitude which were ranked at eleventh (MPS 81.77), twelfth (MPS 81), thirteenth (MPS 80) and fourteenth (MPS 78), respectively.

Followed by these constraints were lack of quality of leadership and human relation skills, lack of information about basic problems of village, poor communication skills and poor knowledge of latest agricultural development programme. These constraints though realized as impediments but with relatively less magnitude.

CONCLUSION

With the results at hand it is indeed disappointing to note that majority of the agricultural graduates are facing varied problems with severe intensity in realizing the purpose and objectives of RAWE. Student READY programme with a component of RAWE was introduced by ICAR to orient students with village life and developing positive attitude and skills to work with farm families .The basic aim was to develop entrepreneur in the field of agriculture. It seems that the programme has not been implemented and monitored in the true spirit and objectives are far reaching .Therefore it is suggested that the concern academic institutions, TOT centers, GO and NGO functionaries and all related agencies should realize the importance of programme and make sincere efforts to improve the present poor status of RAWE so as to develop agricultural graduates as a successful entrepreneur in the field of agriculture.

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DEVELOPMENT OF A SCALE TO MEASURE ENTREPRENEURIAL BEHAVIOUR OF DAIRY FARMERS OF JAMMU REGION

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ABSTRACT

Due to the dearth of a suitable scale for measuring the entrepreneurial behaviour of dairy farmers about improved dairy farming practices in Jammu district of J&K, it was necessary to construct an entrepreneurial behaviour scale for the purpose. Therefore, an attempt was made to develop a test for measuring the entrepreneurial behaviour of dairy farmers about improved dairy farming practices. Relevant 12 statements covering 12 dimensions namely, total commitment and immersion, achievement motivation, management orientation, risk taking ability, innovativeness, self-confidence, leadership ability, utilization of available assistance, economic motivation, scientific orientation, decision making ability and high tolerance to failure / ambiguity was prepared. These statements represented the entrepreneurial behaviour of dairy farmers. After calculating the relevancy percentage and relevancy weightage of the statements, reliability and validity were worked out. The final scale consisted of 12 statements. The responses can be obtained on five point continuum scale namely 'strongly agree', 'agree', undecided', 'disagree' and 'strongly disagree' with the scores of 5, 4, 3, 2 and 1, respectively. Thus, the possible minimum and maximum scores are 12 and 60, respectively. The scale developed will have utility in identifying and studying the dairy entrepreneurs in framing policies by the Government and designing trainings and seminars by training and research institutions. The researchers of social sciences will find the scale useful for studying entrepreneurial behaviour of dairy entrepreneurs. The financial institutions can adopt the scale in deciding criteria for extending the loans to the new entrepreneurs. The entrepreneurs themselves may use the scale to assess their own entrepreneurial skills.

INTRODUCTION

Development of economy of any nation depends primarily on the important role played by entrepreneurs. Entrepreneur is a person who organizes, manages and assumes the risk of a business (Jhamtani, 1996). He is an economic man who tries to maximize its profits by innovations. Across the world entrepreneurs have been considered instrumental in initiating and sustaining socio-economic developments. However, the entrepreneurs are not simply innovators, but they are the persons with a will to act, to assume risk and to bring about a change through organization of human efforts. The part played by such entrepreneurs is of vital importance in developing country like India, where there are ample opportunities for using innovations to exploit the available resources. Thus, in all economic development activities more and more focus is being centered on entrepreneurship of the people. Entrepreneurship means identifying/innovating ideas, products and services, mobilizing resources, organizing production/services and finally marketing them covering the risk with constant strive for growth and excellence (Jhamtani, 1996). Fundamentally, entrepreneurship is a creative act. This creative process can be risky, uncertain and haphazard but it is always dynamic. Entrepreneurs play a key role in the economic development of a country and the development of entrepreneurship is an ingredient of economic development.

The emergence of entrepreneurs in dairying can propel our rural population into self sustaining individuals, who in turn can catalyze the development of the economy. The concept of entrepreneur and entrepreneurship has been frequently applied to the industrial sector. Dairying, on the other hand, has largely been viewed as a non-entrepreneurial

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traditional activity. For rural folk it is a way of life. Hence, farmers were never visualized as business operators and dairying as an enterprise. Not much has been done to develop dairy farmers into entrepreneurs. The genesis of entrepreneurship in dairying is quite recent. It is now being widely accepted that increase in production, productivity, of terms, farm diversification, innovation and development of farmers into self sustaining individuals follow inoculation of the entrepreneurial qualities among farmers. Factors like liberalization of the economy have created the right ambience for growth of entrepreneurs in dairying. This section of the investigation aims to analyse and understand entrepreneurial behaviour of the dairy farmers so as to develop suitable entrepreneurship development strategy for them.

According to Rao (1985) entrepreneurial behaviour is the result of an interaction of individual, situational, psychological, social and experiential factors. Singh (1986) stated that entrepreneurial behaviour was a function of an individual's personality characteristics and environmental factors.

RESEARCH METHODOLOGY

Since a scale developed at other place is not suitable everywhere, so in order to measure the entrepreneurial behaviour of the dairy farmers in study area, the entrepreneurial scale was developed and standardized particularly for the present investigation.

(a) Identification of items justifying dimensions related to entrepreneurial behaviour:

Based on the review of literature on various dimensions of entrepreneurial behaviour and discussion with experts and the advisory committee, a list of 12 statements on 12 dimensions namely, total commitment and immersion, achievement motivation, management orientation, risk taking ability, innovativeness, self-confidence, leadership ability, utilization of available assistance, economic motivation, scientific orientation, decision making ability and high tolerance to failure / ambiguity was prepared. These statements represented the entrepreneurial behaviour of dairy farmers. The statements were edited based on the light of 14 criteria suggested by Edwards (1957).

(b) Judges rating:

After identifying the dimensions and statements under each dimension, it was decided to subject these statements for judges rating. These 12 dimensions with 12 statements as given in Table 1 were given to 20 judges who were experts in academics and having rich experience in the field of extension education and animal husbandry. The judges were requested to indicate their judgment on each statement on a three point relevancy continuum namely 'most relevant', 'relevant' and 'not relevant' with 2, 1 and 0 scores, respectively. They were also requested that they were free to make any modification or suggest any change in each statement if they so desire. Thus, the data furnished by 20 judges was taken into consideration for arriving at selection of items for the scale.

(c) Selection of items:

Based on the responses received from the judges, the relevancy score for each item was found out by adding the scores on the rating scale of all 20 judges' responses. From the data gathered, relevancy percentage and relevancy weightage were worked out for all 12 statements individually by using following procedure given by Padma (2001):

(i) Relevancy percentage: Relevancy percentage was worked out by summing the scores of 'most relevant', 'relevant' and 'not relevant' categories which were converted into percentage.

(ii) Relevancy weightage: Relevancy weightage was calculated for each statement. Relevancy weightage is defined as the ratio of actual score obtained by an item to the maximum possible score of that item.

$$\text{Relevancy weightage} = \frac{\text{Actual Score Obtained}}{\text{Maximum Possible Score}}$$

Using this criterion the statements were screened for their relevancy. Accordingly, items having

Table 1: Dimensions of entrepreneurial behaviour

S. No.	Dimensions of entrepreneurial behaviour	Most relevant (2)	Relevant (1)	Non-Relevant (0)
1.	**Total commitment and immersion:** A dairy farmer should put a great deal of efforts in order to make the vocation successful			
2.	**Achievement motivation:** One should feel a need or desire for excellence to attain a sense of personal accomplishment			
3.	**Management orientation:** A good dairy farmer successfully manages his income generating activities regarding planning, production and marketing functions			
4.	**Risk taking ability:** It is good for a farmer to take risks when he knows his chance of success is fairly high			
5.	**Decision making ability:** An economic man always choose the best alternative from among the available alternatives on the basis of scientific criteria for achieving maximum economic profits			
6.	**Self confidence:** A successful dairy farmer is one who has faith in one's own abilities rather than leave everything to luck			
7.	**Leadership ability:** A farmer should initiate or motivate the action of other fellow farmers towards the achievement of goals			
8.	**Utilization of available assistance:** A good dairy farmer successfully utilizes assistance for dairy farming rendered by the institutions and organizations within the infrastructure			
9.	**Economic motivation:** A successful dairy farmer is one who work hard towards larger yields and achieves maximum economic profits			
10.	**Scientific orientation:** Even a farmer with a lot of experience should experiment with scientific methods in dairying			
11.	**Innovativeness:** It is better for a farmer to adopt technological innovation relatively earlier than others in his social system in order to gain higher levels of farm production and greater profit.			
12.	**High tolerance to failure/ambiguity:** One should remain prepared to meet out any failure or ambiguity			

relevancy percentage of more than 75 percent, relevancy weightage of more than 0.75 were selected for inclusion in the final format of the scale (Table 2). By this procedure all the 12 statements were selected which were suitably modified and rewritten as per the comments and criticisms of the judges.

(d) Reliability of the scale:

According to Kerlinger (1967) "Reliability is the accuracy or precision of measuring instrument". Any newly constructed scale has to be tested for its reliability before it is used. In the present study, the reliability of entrepreneurial behaviour scale was determined by split-half method. The scale was split into two halves on the basis of odd and even number of items and was administered to 10 dairy farmers in a non-sampled area. The responses were rated on three point continuum *viz*., 'agree', 'undecided', 'disagree' having scores of 3, 2 and 1, respectively. Thus, two sets of scores were obtained and then scores were correlated with each other. The

correlation co-efficient for two sets of scores was 0.72. Using Spear-Brown formula, reliability co-efficient was calculated as:

Spear-Brown formula:

$$r_{tt} = \frac{2r_{oe}}{1 + r_{oe}}$$

Where, roe = (r) Karl Pearson correlation co-efficient.

rtt = The reliability of the original test.

The value of rtt came to be 0.837 indicating reliability of the scale.

(e) Validity of the scale:

The term validity means 'truth' or 'fidelity'. Lindquist (1951) defined validity of a test as the accuracy with which it measures that which is intended to measure. Validity, therefore, refers to the degree to which a test measures what it claims to measure. Since the contents of items of entrepreneurial behaviour scale were derived from review of literature, consultation with experts and securing judges' responses on relevancy of items included in the scale, thus, it was assumed that the scores obtained by administering the scale measured the entrepreneurial behaviour of the dairy farmers and nothing else.

Table 2: Standardization of scale to measure entrepreneurial behaviour of dairy farmers

S. No.	Dimensions of entrepreneurial behaviour	Relevancy percentage	Relevancy weightage
1.	**Total commitment and immersion:** A dairy farmer should put a great deal of efforts in order to make the vocation successful	85.00	0.85
2.	**Achievement motivation:** One should feel a need or desire for excellence to attain a sense of personal accomplishment	85.00	0.85
3.	**Management orientation:** A good dairy farmer successfully manages his income generating activities regarding planning, production and marketing functions	80.00	0.80
4.	**Risk taking ability:** It is good for a farmer to take risks when he knows his chance of success is fairly high	87.50	0.87
5.	**Decision making ability:** An economic man always choose the best alternative from among the available alternatives on the basis of scientific criteria for achieving maximum economic profits	92.50	0.92
6.	**Self confidence:** A successful dairy farmer is one who has faith in one's own abilities rather than leave everything to luck	82.50	0.82
7.	**Leadership ability:** A farmer should initiate or motivate the action of other fellow farmers towards the achievement of goals	80.00	0.80
8.	**Utilization of available assistance:** A good dairy farmer successfully utilizes assistance for dairy farming rendered by the institutions and organizations within the infrastructure	76.00	0.76
9.	**Economic motivation:** A successful dairy farmer is one who work hard towards larger yields and achieves maximum economic profits	90.00	0.90
10.	**Scientific orientation:** Even a farmer with a lot of experience should experiment with scientific methods in dairying	77.50	0.77
11.	**Innovativeness:** It is better for a farmer to adopt technological innovation relatively earlier than others in his social system in order to gain higher levels of farm production and greater profit.	85.00	0.85
12.	**High tolerance to failure/ambiguity:** One should remain prepared to meet out any failure or ambiguity	82.50	0.82

Table 3: Entrepreneurial behaviour of dairy farmers

S. No.	Dimensions of entrepreneurial behaviour	SA (5)	A (4)	UD (3)	DA (2)	SDA (1)
1.	**Total commitment and immersion:** A dairy farmer should put a great deal of efforts in order to make the vocation successful					
2.	**Achievement motivation:** One should feel a need or desire for excellence to attain a sense of personal accomplishment					
3.	**Management orientation:** A good dairy farmer successfully manages his income generating activities regarding planning, production and marketing functions					
4.	**Risk taking ability:** It is good for a farmer to take risks when he knows his chance of success is fairly high					
5.	**Decision making ability:** An economic man always choose the best alternative from among the available alternatives on the basis of scientific criteria for achieving maximum economic profits					
6.	**Self confidence:** A successful dairy farmer is one who has faith in one's own abilities rather than leave everything to luck					
7.	**Leadership ability:** A farmer should initiate or motivate the action of other fellow farmers towards the achievement of goals					
8.	**Utilization of available assistance:** A good dairy farmer successfully utilizes assistance for dairy farming rendered by the institutions and organizations within the infrastructure					
9.	**Economic motivation:** A successful dairy farmer is one who work hard towards larger yields and achieves maximum economic profits					
10.	**Scientific orientation:** Even a farmer with a lot of experience should experiment with scientific methods in dairying					
11.	**Innovativeness:** It is better for a farmer to adopt technological innovation relatively earlier than others in his social system in order to gain higher levels of farm production and greater profit.					
12.	**High tolerance to failure/ambiguity:** One should remain prepared to meet out any failure or ambiguity					

SA = Strongly agree; A = Agree; UD = Undecided; DA = Disagree; SDA = Strongly disagree

RESULTS AND DISCUSSION

The final scale (Table 3) consists of 12 statements, which can be administered to the selected dairy farmers of the study area. The responses can be obtained on five point continuum scale namely 'strongly agree', 'agree', undecided', 'disagree' and 'strongly disagree' with the scores of 5, 4, 3, 2 and 1, respectively. Thus, the possible minimum and maximum scores are 12 and 60, respectively.

CONCLUSION

It is concluded that 12 statements were finally selected by securing judges' responses on relevancy of items included in the scale. Therefore, it was assumed that the scale developed; was reliable and valid; for measuring the entrepreneurial behaviour of dairy farmers.

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STATUS OF CROPPED AREA ATTRIBUTES OF HORTICULTURE BASED IFS UNDER NAIP

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ABSTRACT

The aspiring agricultural research Programme in the country was launched in India on 26th July, 2006. It is known as National Agricultural Innovation Project (NAIP), the project focuses on innovations in agricultural technology. It can support poverty alleviation and income generation along with livelihood and nutritional security of tribal families. This is possible through collaborative development and application of agricultural innovations by the public organizations in partnership with farmers' groups, the private sector and other stakeholders. Four districts of Rajasthan, namely, Udaipur, Banswara, Dungarpur and Sirohi prominently as the disadvantaged districts, which are identified by the planning commission, based on income, tribal population, their resources, state of agriculture, etc. Keeping in view the challenges of food and nutritional security, National Agricultural Innovation consortia project was initiated by the ICAR in MPUAT, Udaipur (Rajasthan).

INTODUCTION

In the project of NAIP under MPUAT, Udaipur, two models. (i) Horticulture based IFS and (ii) livestock based IFS model with judicious mix of proven need assessed technologies, appropriate for small and marginal farmers encompassing end to end approach were planned for development of appropriate replicable models. The public private partnership in a consortia mode was expected to accelerate the pace of sustainable development and increasing productivity. Cluster approach in a specific sites differing in natural resource base in four identified district was chosen. Appropriate, sound and effective baskets of technologies aimed at propelling agricultural transformation leading to increase in farm employment, increased productivity and profitability. Better management of natural resources, processing and value addition and federating farmers for marketing of their produce were the another strategies for research. The strategies developed drawn heavily on the past proven technologies, testing them in integrated and holistic manner and having multiple technology options for increased income leading to better quality of life to families in the clusters identified for creating sustainability fund through farmers' contribution, which will take care of post project sustainability.

A number of innovations were built in the design to ensure success of sustainable livelihood and nutritional security. Creation of rural technology centres in each cluster aimed at reducing knowledge gap, technological empowerment and entrepreneurship development. Another innovation was the establishment of farmers' business groups and Producers' Companies to empower producers by making them active entrepreneurs- cum-primary stakeholders in the process of development.

Integrated farming system approach provides food security, balanced food, quality food basket, enhanced farm income, higher employment generation, social upliftment, effective recycling of resources, sustainable soil health, reduced risk and minimum environmental pollution.

Under the NATP, integrated farming system modules were tested on limited scale and essentially taken up for testing only, a few technology options without taking into account the resources base as well as multiple options from basket of technologies

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suited to small and marginal farmers. Many of the ICAR institutes and SAU's have developed technologies, which individually lead to improvement in crops or animal productivity. The concept "development" during NATP was very sound but technologies were disseminated to individual farm families.

Considering the short comings of NATP, the enthusiastic new initiative has been made in the country in the name of NAIP. Many of the SAU's have been entrusted to take up consortia project related to NAIP for food and nutritional security. Maharana Pratap University of Agriculture and Technology, Udaipur was also sanctioned a consortia project titled "livelihood and nutritional security of tribal dominated areas through integrated farming system and technology models" with worth Rupees 18.38 crores. This consortia project consisted of two types of IFS's (i) Horticulture based IFS and (ii) Livestock based IFS. As per the knowledge and information to the researcher, no empirical study so far has been conducted by any other researcher to evaluate the project in relation to Horticulture based IFS.

RESEARCH METHODOLOGY

The present study was under taken the project implemented by MPUAT, in Udaipur, Durgapur, Banswara and Sirohi district of Rajasthan. District and clusters were selected purposely due to working area in the state. From the selected clusters, 10 clusters, where NAIP was implemented. From the selected villages, there were 78 villages, in which the NAIP was executed, out of these, 28 were the sampled villages for conducting the Mid-term evaluation. Therefore, purposively, these 28 villages were considered as selected for the present study. A sample 130200 Beneficiaries were covered under NAIP in 78 villages of 10 clusters. But sampled respondents for mid-term evolution of consortia NAIP were as many as 66 each from 10 clusters (total 660). The sampled respondents did vary from village to village so selected for evaluation of the consortia project. Out of these 660 total sampled respondents of consortia project, total 288 beneficiaries were sampled for the present investigation. Thereafter, collected data were analyzed, tabulated and interpreted in the light of above objective. The SPSS 13.0 version software was used for statistical analysis of data.

1. District wise distribution of farm families (male, female and children) of NAIP study area

The data depicted in Table 1 reveal that the population of Female and Children of targeted beneficiaries under NAIP were maximum (175 and 306 respectively) in Udaipur district followed by Dungarpur, Sirohi and Banswara.

Looking to the results, it is inferred that the NAIP in the investigation area has duly addressed the livelihood and nutritional security. Therefore, concluded that NAIP had exerted desired definite positive impact as regards selection of targeted beneficiaries. At the same time, the gender issue, which is of national concern, has also been taken care of because male members of the families were also of considerable member (24.17 per cent) under NAIP. The results are similar with the findings of Tripta and Kaushik (2003) and Jangid (1994).

2. Classification of farmers according to cropped area (ha) during execution of NAIP

The classification of NAIP beneficiaries according to cropped area (ha) during execution of NAIP (2010-2011) has given been in Table 4. Data reval that of total 288 beneficiaries, majority of 260 (90.28 per cent) fell under marginal category of cropped area in kharif season followed by 255 (88.54 per cent) under marginalized cropped area in ha in rabi season.

It is striking to report that none of the farmers used their land for zaid season. It means that most of the beneficiaries grown crops during rabi and kharif seasons.

Further, it is also observed that NAIP beneficiaries of Udaipur district were leading in terms of cropped area (ha.) for kharif and rabi crops followed by Dungarpur, Sirohi and Banswara.

Table 1: District wise distribution of male, female and children of NAIP study area

District	Male f	Female f	Children f	Total f
Udaipur	153 (24.13)	175(27.60)	306(48.26)	634(100.00)
	38.35*	35.35*	40.42*	38.40*
Sirohi	83 (25.38)	99(30.28)	145(44.34)	327(100.00)
	20.80*	20.00*	19.15*	19.81*
Dungarpur	95 (24.42)	123(31.62)	171(43.96)	389(100.00)
	23.81*	24.85*	22.59*	23.56*
Banswara	68(22.59)	98(32.56)	135(44.85)	301(100.00)
	17.04*	19.80*	17.83*	18.23*
Total	399(24.17)	495(29.98)	757(45.85)	1651(100.00)
	100.00*	100.00*	100.00*	100.00*

f= frequency, %= Percentage, n= Total number of respondents, *= Percentage to columns, Figures in the parentheses show percentage of rows

Therefore, it is apparent that marginal farmers with regards to kharif and rabi cropped area were more in case of Udaipur district. The results show that NAIP could not exert positive impact in terms of cropped area under Horticulture based IFS under NAIP. Hence, the results reflect discouraging impact with regards to interventions of Horticulture based IFS in the study area for zaid season. It may be due to lack of irrigation facilities in the area.

Khare and Kumar (2004) reported that there was cent per cent increase of area under vegetables in watershed area. The results are also contradictory with those of Lakhera (2000), Singh *et al.* (1992) and Kiresur and Prasad (1994).

CONCLUSION

In line with the results on cropped area during execution of NAIP, it is concluded that most of the beneficiaries were from marginal land holdings under rabi and kharif crops. None of the farmers had grown zaid horticultural crops, it is concluded that the NAIP consortium project might have not exerted much for facilities of irrigation water in the study area and might have not persuaded the beneficiaries for growing zaid horticulture crops in orchard for their livelihood and nutritional security.

Similarly, it is recommended that much importance must be given in future under such prestigious projects to marginal and small farmers for their progress in relation to horticulture crops (Fruits and vegetables).

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Table 2: Classification of farmers according to cropped area (ha) during execution of NAIP

n=288

District	Season wise crops (ha)											
	Karif				Rabi				Zaid			
	<1 f	2-Jan f	>2 f	Total	<1 f	2-Jan f	>2 f	Total	<1 f	2-Jan f	>2 f	Total
Udaipur	106(92.17)	8(6.96)	1(0.87)	115(100.00)	100(86.96)	12(10.43)	3(2.61)	115(100.00)	96(83.48)	19(16.52)	0	115(100.00)
	40.77*	34.78*	20.00*	39.93*	39.22*	46.15*	42.86*	39.93*	36.92*	67.86*		39.93*
Sirohi	48(87.27)	6(10.91)	1(1.82)	55(100.00)	46(83.64)	7(12.73)	2(3.64)	55(100.00)	52(94.55)	3(5.45)	0	55(100.00)
	18.46*	26.09*	20.00*	19.10*	18.04*	26.92*	28.57*	19.10*	20.00*	10.71*		19.10*
Dungarpur	60(88.24)	7(10.29)	1(1.47)	68(100.00)	62(91.18)	5(7.35)	1(1.47)	68(100.00)	64(94.12)	4(14.29)	0	68(100.00)
	23.08*	30.43*	20.00*	23.61*	24.31*	19.23*	14.29*	23.61*	24.62*	14.29*		23.61*
Banswara	46(92.00)	2(4.00)	2(4.00)	50(100.00)	47(94.00)	2(4.00)	1(2.00)	50(100.00)	48(96.00)	2(4.00)	0	50(100.00)
	17.69*	8.70*	40.00*	17.36*	18.43*	7.69*	14.29*	17.36*	18.46*	7.14*		17.36*
Total	260(90.28)	23(7.99)	5(1.74)	288(100.00)	255(88.54)	26(9.03)	7(2.43)	288(100.00)	260(90.28)	28(9.72)	0	288.0(100.00)
	100.00*	100.00*	100.00*	100.00*	100.00*	100.00*	100.00*	100.00*	100.00*	100.00*		100.00*

f= frequency, %= Percentage, n= Total number of respondents, *= Percentage to columns, Figures in the parentheses show percentage of rows

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FARMING SYSTEM MODELS ADOPTED BY THE FARMERS OF SUB HUMID SOUTHERN PLAIN AND ARAVALLI (IVA) ZONE OF RAJASTHAN

Lokesh Kumar*, F.L. Sharma and S.S. Sisodia*****

ABSTRACT

The present study was conducted in Sub Humid Southern Plain and Aravalli (IVa) Zone of Rajasthan by selecting four districts i.e. Udaipur, Bhilwara, Chittorgarh and Rajsamand purposely. Among these four districts 240 farmers were selected randomly. Thirteen Integrated Farming System models were selected for the study purpose. The results of study indicated that "crop+dairy" was the most important adopted farming system model by the farmers and ranked first. The next important IFS model adopted by the farmers was "crop+goat" and "crop+poultry" which were ranked second and third, respectively. It is further noted that least adopted IFS model was "Crop Only" and "Crop + Dairy + Horticulture + Ship + Goat + Poultry" which were ranked thirteen and twelfth, respectively.

INTRODUCTION

Agriculture faces numerous challenges in the 21st century, including the need to produce more food and fiber to feed a growing population with a shrinking rural labour force, more feed stocks for a potentially huge bioenergy market. Despite India's fast economic expansion, agriculture has grown at a fairly modest pace in the recent years. According to the Economic Survey of India, food grain output decelerated to 1.2 per cent during 1990-2007, lagging behind population growth of 1.9 per cent. Our country's population is expected to reach 1370 million by 2030, and 1600 million by 2050. To meet the demand, we have to produce 289 and 349 MT of food grains during the respective periods.

Because of the growing Indian population, as well as the spread of urbanization and industrialization, the size of agricultural land holdings is shrinking. This condition poses a major threat to the long-term viability of agriculture and food security. In this context, the Integrated Farming Approach holds special importance. None of the by-products are wasted in the IFS system. In comparison to the traditional monoculture techniques, the by-products of one system become inputs for other crops under an integrated farming strategy. IFS offer several benefits in areas such as sustainability, food security, farmer security and poverty reduction.

RESEARCH METHODOLOGY

The study was conducted in Rajasthan which is located on the north-western side of India. The state is endowed with diverse soil and weather conditions comprising of several agro-climatic situations, warm humid in south-eastern parts to dry cool in western parts of the state. The Rajasthan state has well-defined ten agro-climatic zones. In which sub humid southern plains and Aravalli Zone IVa purposely selected for the present study. It comprises of four districts namely Bhilwara, Chittorgarh, Rajsamand and Udaipur. From each district, two clusters were selected on the basis of maximum number of farmers who adopted various type of IFS models. From each selected cluster, 30 farmers were selected by simple random sampling technique. Thus, the total sample was of 240 farmers. For the collection of data, structured interview schedule was prepared. For the analysis of collected data, the appropriate statistical methods were used for interpretation of data.

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RESULTS AND DISCUSSION

To find out the adoption of various farming systems by the farmers a total of thirteen models were considered in the adoption scale. For this, the frequency for each model was calculated and ranked accordingly.

The data recorded in Table 1 show that crop+dairy was the most important IFS model adopted by the farmers of Bhilwara district and ranked first. This was followed by Crop+Goat IFS model which was adopted by 14 farmers of Bhilwara district. The IFS model namely crop only, crop+dairy+azolla|/vermiculture, crop+poultry+ goat and crop+dairy+poultry were least important adopted by the farmers. In case of Chittorgarh district, crop+dairy was the most important adopted farming model and crop+agroforestry, crop+horticulture+apiculture and crop+dairy+ poultry were least important farming model adopted by the farmers. While in Rajsamand district crop+dairy was also most important adopted farming system model and crop+dairy+azolla/ vermiculture was least important adopted farming system model. Likewise in Udaipur district, crop+dairy+horticulture was most important farming system model adopted by the farmers and ranked first. This model is most appropriate and farmers were getting regular income from crop, dairy and horticulture enterprises throughout the year. Whereas, crop+poultry, crop+agroforestry and crop+dairy+poultry were least important adopted farming model adopted by the equal number (2) of respondents.

Further, analysis of the table shows that out of total respondents, crop+dairy was the most important adopted farming system model by the farmers of Zone IVa of the Rajasthan. This was followed by crop+goat, crop+dairy+horticulture, crop+horticulture, crop+sheep, crop+poultry, crop

Table 1: Integrated Farming System models adopted by the respondents n=240

S.No.	IFS Model	Bhilwara District		Chittorgarh District		Rajsamand District		Udaipur District		Total	
		f	Rank	f	Rank	f	Rank	f	Rank	f	Rank
1	Crop Only	1	VII	0	VIII	0	X	0	X	1	XIII
2	Crop+Horticulture	3	V	6	IV	10	II	11	II	29	IV
3	Crop + Dairy	20	I	21	I	18	I	9	III	67	I
4	Crop + Sheep	3	V	7	III	4	VI	4	V	18	V
5	Crop + Goat	14	II	9	II	8	III	8	IV	38	II
6	Crop + Poultry	4	IV	5	V	5	V	2	VIII	16	VI
7	Crop+Dairy+Horticulture	7	III	3	VI	6	IV	17	I	34	III
8	Crop+Dairy+Horticulture+ Ship+Goat+Poultry	2	VI	0	VIII	1	IX	1	IX	3	XII
9	Crop+Agroforestry	3	V	2	VII	4	VI	2	VIII	11	VII
10	Crop+Horticulture+ Apiculture	0	VIII	2	VII	1	IX	0	X	5	X
11	Crop+Dairy+Azolla/ Vermiculture	1	VII	0	VIII	2	VIII	1	IX	4	XI
12	Crop+Poultry+Goat	1	VII	3	VI	0	X	3	VII	7	IX
13	Crop+Dairy+Poultry	1	VII	2	VII	3	VII	2	VIII	8	VIII

f=frequency

+agroforestry, crop+dairy+poultry, crop+poultry+goat, crop+horticulture+apiculture, crop+dairy+azolla/vermiculture, crop+dairy+horticulture+ship+goat+poultry which were adopted by 38, 34, 29, 18, 16, 11, 8, 7, 5, 4 and 3 farmers, respectively. These were ranked second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh, twelfth and thirteenth, respectively.

From the above discussion, it can be concluded that crop+dairy, crop+goat, crop+dairy+horticulture and crop+horticulture models were commonly and popularized among the farmers of agroclimatic zone IVa of Rajasthan.

The present findings are in accordance to the findings of Singh (2019) where 53.33 per cent of the respondents were engaged in croping+dairy as their main farming system in practice for livelihood, followed by 20.83 per cent and 13.33 per cent of them were engaged in crop+dairy+horticulture and crop+horticulture as their farming system in practice, respectively. Similar findings were also reported by Ranawat and Sisodia (2017), Nikam et al. (2019) and Singh et al. (2017).

CONCLUSION

The study clearly states that "crop+dairy" was the most important adopted farming system model by the farmers and ranked first. The next important IFS model adopted by the farmers was "crop+goat" and "crop+poultry" which were ranked second and third, respectively. It is further noted that the least adopted IFS model was "Crop + Dairy + Horticulture + Ship + Goat + Poultry" and "Crop Only" which were ranked twelfth and thirteenth. It can be concluded that "crop+dairy" was the most popular and profitable IFS model among the various farming systems.

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CONSTRAINTS AND THEIR REMEDIAL MEASURES TOWARDS SOCIAL MEDIA USE IN FARMING

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ABSTRACT

Social media has emerged as a highly powerful tool in facilitating online social interactions and has shown tremendous potential in facilitating information exchange among individuals. It has been extensively used by farmers to tremendous increase in the number of smart-phones users during the last decade. A study was conducted during 2021-22 to findout the constraints of farmers towards social media use in farming. A total of 140 progressive farmers using social media were randomly selected from purposively selected blocks of the Kota division of Rajasthan. Results of the study revealed that more internet data required followed by costly data for internet in the market, difficulty in understanding and proper utilization of information, lack of educational & technical literacy, lack of sufficient time to identify the useful information, poor internet connectivity, higher cost of mobile phones, lack of authenticity of information, mostly irrelevant posts and useless information, and irregular power supply in the rural area were the main constraints in the minds of social media users in farming. Providing low-cost mobile phones at subsidized rates followed by social media should be used by extension agencies in sharing information, increasing awareness about social media use in farming, providing high-speed internet connectivity, timely response the query by the experts, assuring the authenticity of the information shared, provide internet data at low cost, minimize irrelevant and useless posts and regular power supply in the rural area were remedial measures to overcome the constraints in social media use in farming.

INTRODUCTION

Social media has emerged as a highly powerful tool in facilitating online social interactions and has shown tremendous potential in facilitating information exchange among individuals. Excessive growth of contemporary social media tools has primarily affected the characteristics of social relations and human psychology. Various social media platforms such as social networking sites (Facebook, Google+); micro-blogs (Twitter, Instagram); content communities (YouTube, Flickr, Tumbler), forums (Google hangout); socially-integrated messaging platforms (WhatsApp, Snapchat, Facebook, Telegram); and professional networking platforms (ResearchGate, LinkedIn, Academia.edu) have emerged over the past two decades. Most social media does not require special skills and training, however, reading and writing skills are required. The fast-growing use of social media and mobile technologies create opportunity for the dissemination of technologies which can facilitate creating, sharing, preserving, and dissemination of knowledge and skills to transform agriculture (Owiny *et al.*, 2014). The basic philosophy of social media is the democratization of information, communication, and knowledge management (Saravanan *et al.*, 2015). It refers to the user-generated information, opinion, video, audio, and multimedia that shared and discussed over digital networks (Andres and Woodard, 2013). Social media means interactions among people in which they create, share, consume and exchange information and ideas in virtual communities and networks. It gives farmers a voice and an opportunity to directly connect with their customers, which can help in direct marketing and increased profits alongside facilitating mass-personal communication (Carr and Hayes, 2015).

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The privacy issues, lack of control over the content,time allocation, inability to access social media, and lack of training about social media were the major constraints faced for utilization and sharing of information from social media (Newbury *et al*., 2014). The major impeding factor for social media use was the lack of authenticity of the information shared online followed by faulty internet connection, unproductive use of time, and lack of expertise were the major drawbacks of using social media (Suchiradipta and Saravanan 2016). The lack of awareness, know-how, time deficiency, lack of authenticity and relevancy in information, internet connectivity issues, meaningless conversations, falsely exaggeration of sensitive agrarian issues, and unfavorable institutional policies hinder its use up to the optimal level in agribusiness and result in the low perception of agripreneurs towards social media tools for attaining agribusiness advantages (Kaur and Singh, 2021).

RESEARCH METHODOLOGY

The study was conducted in the Kota division of Rajasthan during 2021-22. Kota division was selected purposively because it is the agri-dominant region with ample high-yielding varieties, rich black fertile alluvial soils, strong irrigation, advanced farming practices adopted by the farmers, and higher crop productivity than the average yield of the state and in some cases, higher than the average yield of the country. One Panchayat Samiti from each district of the Kota division namely; Ladpura (Kota), Anta (Baran), Bundi (Bundi), and Jhalrapatan (Jhalawar) was purposively selected wherein; Krishi Vigyan Kendras (KVKs-Farm Science Centres) are located. A list of KVK progressive farmers who are using social media was prepared in consultation with officials of respective KVKs. Subsequently, an equal number of thirty-five progressive farmers from each selected Panchayat Samiti were randomly selected. The data were collected from 140 randomly selected progressive farmers. For this purpose, a semi-structured interview schedule was developed and data were processed, tabulated, and analyzed.

RESULTS AND DISCUSSION

It is evident from Table 1 that more internet data required (MPS 74.52) was the first constraint in the minds of social media users in farming. It was followed by costly data for internet in the market (MPS 73.80), difficulty in understanding and proper utilization of information (MPS 71.42), lack of educational& technical literacy (MPS 69.28), lack of sufficient time to identify the useful information (MPS 68.80), poor internet connectivity (MPS 67.85), higher cost of mobile phones (MPS 65.76), lack of authenticity of information (MPS 62.23), mostly irrelevant posts and useless information (MPS 61.19), and irregular power supply in the rural area (MPS 59.77) and these were II, III, IV, V, VI, VII, VIII, IX, and X rank as constraints in

Table 1: Constraints being faced by the respondents towards the use of social media in farming

S.No.	Constraints faced by the farmers	MPS	Rank
1	More internet data required	74.52	I
2	Costly data for internet in the market	73.80	II
3	Difficulty in understanding and proper utilization of information.	71.42	III
4	Lack of educational & technical literacy	69.28	IV
5	Lack of sufficient time to identify the useful information	68.80	V
6	Poor internet connectivity	67.85	VI
7	Higher cost of mobile phones	65.76	VII
8	Lack of authenticity of information	62.23	VIII
9	Mostly Irrelevant posts and useless information	61.19	IX
10	Irregular power supply in the rural area	59.77	X

Table 2: Remedial measures offered by the respondents to overcome the constraints in social media use in farming

S.No.	Remedial measures offered by the respondents	MPS	Rank
1	Provide low-cost mobile phones at subsidized rates	76.19	I
2	Social media should be used by extension agencies in sharing information	73.53	II
3	Increasing awareness about social media use in farming	70.23	III
4	Provide high-speed internet connectivity	69.28	IV
5	Timely responding to the query by the experts	68.57	V
6	Assuring authenticity of information shared	66.19	VI
7	Provide internet data at a low cost	63.80	VII
8	Minimize irrelevant and useless posts	61.19	VIII
9	Regular power supply in the rural area	56.66	IX

the minds of social media users in farming respectively. Similar findings were reported by Saravanan and Bhattacharjee (2014), Kipkurgat *et al*. (2016), Thakur and Chander (2018), Shelke (2020) and Kour and Singh (2021).

Remedial measures offered by the farmers to overcome the constraints in social media use in farming:

Table 2 reveals that a higher percentage of the farmers according to the MPS value suggested that providing low-cost mobile phones at subsidized rates (MPS 76.19) was a remedial measure to overcome the constraints in social media use in farming and assigned 1st rank among remedial measures. It was followed by social media should be used by extension agencies in sharing information (MPS 73.53), increasing awareness about social media use in farming (MPS 70.23), providing high-speed internet connectivity (MPS 69.28), timely response the query by the experts (MPS 68.57), assuring the authenticity of the information shared (MPS 66.19), provide internet data at low cost (MPS 63.80), minimize irrelevant and useless posts (MPS 61.19) and regular power supply in the rural area (MPS 56.66) and these were ranked II, III, IV, V, VI, VII, VIII, and IX as remedial measures to overcome the constraints in social media use in farming, respectively. Similar results were reported by Thakur and Chander (2018) that the majority (79.17%) of the respondents felt that the internet connectivity should be improved in their region. Also, a sufficient number of users (77.08%) felt that the reduction in internet data tariffs can be an important step to avail full benefits of social media use in agriculture.

CONCLUSION

Social media networks have no doubt affected the lives of rural people. Social media are electronic communication tools that allow users to interact, create, share, retrieve, and exchange information and ideas in any form that can be discussed, archived, and used by virtual communities and networks. It can be concluded that more and costly internet data, difficulty in understanding information, lack of educational & technical literacy, lack of sufficient time to identify the useful information, poor internet connectivity, higher cost of mobile phones, lack of authenticity of information, mostly irrelevant posts and useless information were the important constraints in the minds of social media users in the farming. Providing low-cost mobile phones, increasing awareness about social media use in farming, providing high-speed internet connectivity, timely response the query by the experts, assuring the authenticity of the information shared, provide internet data at low cost, minimize irrelevant and useless posts may be remedial measures to overcome the constraints in social media use in

farming.

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KNOWLEDGE ABOUT SCIENTIFIC BROILER FARMING PRACTICES AMONG TRAINEE AND NON-TRAINEE FARMERS IN UTTAR PRADESH

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ABSTRACT

The livestock sector and sub-sector play important role in agriculture and Indian economy. These are not only providing nutritional security but also provide employment. Among livestock sector, poultry are the fastest growing and high sustainable subsector. Indian government seeks interest in the poultry industry and implement many programmes to improve the knowledge level and skill development of farmers about poultry farming. To "assess the impact of training on the non-trainee broiler farmers' knowledge level" a study was conducted purposively in Uttar Pradesh state as the majority of broiler farmers, who had received training from CARI, Izatnagar, belonged to this state. 90 trainees and 90 non-trainees broiler farmers were selected randomly from the list of trainees and non-trainees broiler farmers. Results of the study revealed that 45.55per cent of the trainees broiler farmers had high knowledge levels followed by medium (37.78%) and low (16.67%) knowledge level about scientific broiler farming. While among the non-trainee broiler farmers, the majority of the respondents belonged to medium (53.34%) knowledge levels followed by low (33.33%) and high (13.33%) knowledge levels about scientific broiler farming. The non-trainee broiler farmers had a low knowledge level of scientific broiler farming as compared to trainees. Kshandakar *et al.*, (2018) revealed that poultry training improves the knowledge level of trainees about broiler breeds, marketing, feeding, health care management, etc. Total average man-days generated per year were 419.63 and 871.68 among the trainees and non-trainees broiler farmers, respectively.

INTRODUCTION

The livestock sector and sub-sector play important role in the agricultural and Indian economy. These are not only providing nutritional security but also employ the rural as well as urban people. Among livestock, sector poultry are the fastest growing and high sustainable sub-sector. The annual growth rate of layer and broiler was 6-7 per cents and 10-11per cents, respectively and poultry nearly contributed 1 per cent to national GDP and 14 per cents to livestock GDP (Economic survey 2020-21). However, poultry is mainly concentrated in the southern region of India, whereas only five states contribute 65per cent of the total poultry production (BAHS, 2021). Other regions of India also have immense potential to grow and develop the poultry industry and Government and poultry layers are now focused on these regions. Different government and non-government institutes are providing training to develop knowledge, skill, and self-confidence in poultry. Indian and state governments seek interest in the poultry industry and implement many programs to improve the knowledge level and skill development of farmers about poultry farming. One of the poultry development programmes implemented at CARI, Izatnagar to provide training to the farmers in different aspects of poultry *viz*. specialized broiler, specialized layer, regular poultry management, hatchery management, etc. since 2013. There is no study was conducted to assess the knowledge level of broiler farming hence this study conducted.

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RESEARCH METHODOLOGY

An ex-post-facto research design was adopted in this study. The study was conducted purposely in Uttar Pradesh state as the majority of broiler farmers, who had received training from CARI, Izatnagar belonged to this state. Out of broiler farmer adopters, 90 trainee broiler farmers were selected randomly from the list of adopter broiler farmers. Non-trainee broiler farmers in equal numbers were selected from the same district from which the trainee broiler farmers belonged. Thus, 90 trainee adopters and 90 non-trainee broiler farmers were selected for the present study. The total sample size was 180 for this study. For analysis of accurate and appropriate knowledge level of farmers about scientific broiler farming practices researcher construct and standardized knowledge test where forty-two questions were available in the final format of knowledge test about different aspects of broiler farming practices *viz*. brooding management practices, housing management practices, feeding management practices, health and bio-security management practices, and marketing management practices. Eight questions related to each brooding and housing management practices, six questions related to feeding management, maximum and minimum questions fourteen and five from health and bio-security measures, and marketing management, respectively. The total obtained scores of respondents ranged from 0 to 42. Data were collected throw a structured interview method. Descriptive statistics such as frequency, percentage, mean, standard deviation, and t-test were used.

RESULTS AND DISCUSSION

Table 1 reveals that 45.55 per cent of the trainee broiler farmers had high knowledge level followed by medium (37.78%) and low (16.67%) knowledge level about scientific broiler farming. While, among the non-trainee broiler farmers, the majority of the respondents belonged to medium (53.34%) knowledge levels followed by low (33.33%) and high (13.33%) knowledge levels about scientific broiler farming. Pooled analysis reveals that nearly half (49.44%) of the respondents belonged to a medium knowledge level about scientific broiler farming followed by high (25.56%) and low (25%). Average knowledge scores among the trainee and non-trainee broiler farmers were 33.45 and 26.7, respectively. Overall average knowledge level about scientific broiler framing was 30.7. Trainee broiler farmers had a higher knowledge level about scientific broiler framing because they took training from CARI and applied their knowledge at the field level. Islam *et al*., (2014) also reported a similar finding to this study i.e., the non-trainee broiler farmers had a low level of knowledge about scientific broiler farming as compared to trainees. Kshandakar *et al.*, (2018) revealed that poultry training improves the knowledge level of trainees about broiler breeds, marketing, feeding, health care management, etc. The independent sample 't' value indicated a significant difference between trainee and non-trainee broiler farmers concerning scientific knowledge level.

Knowledge level among trainees and non-trainees was significantly correlated with flock size, adoption of scientific broiler farming practices and entrepreneurial behavior of farmers at 1 per cent level of significance.

Table 1: Distribution of respondents based on their scientific knowledge level

Knowledge scores	Trainees	Non-trainees	Pooled
Low (24-28.66)	15 (16.67)	30 (33.33)	045 (25.00)
Medium (28.67-32.33)	34 (37.78)	48 (53.34)	082 (45.56)
High (32.34-38)	41 (45.55)	12 (13.33)	053 (29.44)
Mean ± Sd	33.45±3.39	26.70±4.12	30.70±3.75
t value		7.865**	

(Figures in the parentheses indicate percentage) (**significant at 1% level of significance)

Table 2: Correlation between knowledge about scientific broiler farming practices and some variables

Variables	Correlation between knowledge
Age	.371
Education	.105
Experience	-.161*
Flock size	.215**
Adoption of scientific	.400**
broiler farming practices	.000
Entrepreneurial behavior	.226**

**Correlation is significant at the 0.01 level.

*Correlation is significant at the 0.05 level.

Employment generation from broiler farming

The total average man-days generated per year were 419.63 and 871.68 among the trainees and non-trainees, respectively. Trainees generated maximum man-days from feeding and watering of the birds (180.25) followed by supervision (120.25), cleaning (50.32), weighing of the birds (27.4), other activities (23.15), and health care (18). It also shows that 72.37 man-days were created for females and 347.25 man-days for males, whereas females mainly engaged in cleaning activities. In the case of non-trainee broiler farmers maximum man-days generated through feeding and watering (316), supervision (220), cleaning of waterers, feeders, and poultry house (119.75), health care (105), weighing of birds (73.5) and other activities (35.43). While, man-days generated for the females and male were159.18 and 712.5, respectively.

Discussion

Trainee and non-trainee broiler framers both knew broiler framing practices, however, trainees have higher knowledge levels and better skills in broiler farming. Thakur *et al*. (2021) revealed in their study the impact of skill development training on poultry production that marked improvement in knowledge level and skill of the farmers regarding poultry. Training not only improve the knowledge level but motivate the farmers to take risk and start poultry framing and strengthening the sustainability of poultry enterprises. Singh *et al.*, (2013) also suggested that training programmes effectively improve the knowledge of trainees of broiler farming. Training programmes not only increase knowledge levels but also help to start new poultry farms. Thakur

Table 3: Employment generation from broiler farming of trainee and non-trainee broiler farmers

Activities	Trainees					Non-trainees				
	Family labours		Hired labours			Family labours		Hired labours		
	Female	Male	Female	Male	Total	Female	Male	Female	Male	Total
Supervision	5.5	105	0	10	120.5	0	165	0	55	220
Feeding+ watering	5.25	80	3	92	180.25	9	27	15	265	316
Cleaning (Waterers + Feeders + house)	30	0	15.32	5	50.32	14	3	90.75	12	119.75
Health care	0	7	1	10	18	0	5	0	100	105
Weighing	1	5	2	19.4	27.4	6	15	7	45.5	73.5
Other	4	10.37	5.3	3.48	23.15	6.43	10	11	10	37.43
	45.75	207.37	26.62	139.88	419.62	35.43	225	123.75	487.5	871.68
	253.13		166.50			260.43		611.25		
Grand Total	419.63					871.68				

et al. (2021) revealed that skill development programmes on poultry not only improve knowledge but also help to start new or strengthen existing poultry. Training programmes improve the per bird profit and reduced per bird cost ultimately making farms profitable and sustainable. Patil *et al.*, (2021) revealed that the production efficiency of poultry entrepreneurs was improved due to skill-based poultry programs.

Poultry has immense potential to generate self-employment as well as employ others. Trainee and non-trainee both employ people engaged in different poultry activities whereas, non-trainees generated more man-days than the trainees because the farmer category kept a large flock size and more number of batches per year.

CONCLUSION

"Without knowledge and skills, we are just empty vessels" the above study also proved that poultry skill development training has positive impact on knowledge as well as the performance of poultry farmers about all aspects of poultry farming practices. There is a need to motivate and create interest in the farmers for more and more participation in training programmes and take advantages of these training programmes to gain self-employment and generate income for improve their livelihood. Poultry has immense potential to create viable entrepreneurial opportunities to provide employment to rural people though the participation of females was least in the care and management of poultry farm. There is a need to support and be awared for women of poultry farming to gain employment as a part time job with their family responsibilities.

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BEHAVIOUR OF URBAN WOMAN CONSUMERS REGARDING PURCHASING OF PACKAGED FOOD PRODUCTS

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ABSTRACT

Consumer buying area in India is one of the largest in the world. The consumer now exhibits a totally different buying behavior what they used to do in a regulated market. Urban women are most powerful consumers in the world as they control almost 80 % of the household spending. The study was conducted purposely in Kota district of Rajasthan State. The Sample size of the study was comprised of total 240 woman consumers. Total sample were divided into two categories of 120 working urban woman consumers from educational institutions and 120 from non-working urban woman consumers from commercial shops like Big Bazar, Mall and Retail shop of Kota city. Results indicated that maximum urban working women were buying from discount store of ready to eat (41.67%) and ready to cook (40%) packaged food. Maximum number of working women (39.17%) said that they purchased products as per need. Majority of working women (56.67%) also indicated that they go for planned purchase for packaged food products. Thus, it can be concluded that working woman consumers were more aware, better knowledge and better purchasing decision and purchasing behavior regarding packaged food products.

INTRODUCTION

Consumer purchasing area in India is one of the largest in the world. Indian markets have been witnessing several changes towards globalization, liberalization and privatization and a large scale entry of multinational companies are major outcomes of new economic order. Consumer buying behavior can be defined as the decision-making process and physical activity involved in acquiring, evaluating, using and disposing of goods and services. This definition clearly brings out that it is not just the buying of goods/services that receives attention in consumer behaviour but, the process starts much before the goods have been acquired or bought. Consumer behavior is influenced by external, social, cultural, personal and psychological factors which affecting the consumer behavior to the extent that they help to improve our appearance. Therefore, the present study aimed "to assess the buying behaviour of working and non-working urban woman consumers regarding purchasing of packaged food products.

REAEARCH METHODOLOGY

The present study was conducted in Kota district of Rajasthan. The sample size of the study comprised of total 240 urban women consumers. Total sample was divided into two categories,120 working urban woman consumers were from educational institutions and 120 non-working women were from the commercial shops like Big bazaar, Mart and Retail shops of Kota city. To study the buying behavior of urban woman consumers towards selected packaged food products. The selected food products are firstly Ready to Eat Food Items-Snacks (Biscuits, Potato Chips, Kurkure etc.), Bakery of food Products (Cakes, Bread, Toast, etc.), Preservative Products (Jam, Jelly, Catch-up etc), Beverages (Horlics, Cold Drink, Canned Juices, etc.) and Milk & Milk Products (Flavored Milk, Cheese, Butter etc.) and secondly Ready to Cook Food Items : Snacks Mixes (Idli, Dosa, Khaman, Maggi, Pasta, etc.), Dessert Mixes (Gulab Jamun, Kheer, Cakes etc.), Curry Mixes (Vegetable, Gravy etc.) and Soup Mixes (Tomato, Hot and Sour etc.). The multistage

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random and convenience sampling techniques were used for selection of respondents.

RESULTS AND DISCUSSION

The major objective of the research was to assess the buying behaviour of respondents about packaged food products in Kota districts of Rajasthan. The results about the place of purchasing of ready to eat packaged food products are presented in Table1.

Table 1 shows that maximum number of working women (35.83%) purchased ready to eat packaged food products from retail store followed by discount stores (34.17%) and super market chains (30%). Whereas, majority of non-working women (41.67%) purchased ready to eat packaged food products from discount stores followed by super market chains (33.33%) and retail stores (25%). From the above results, it can be concluded that majority of the women Preferred to purchase ready to eat packaged food products from the discount stores in the study area.

The data regarding place of purchase of ready to cook packaged food products are given in Table 2.

The data presented in Table 2 reveal that majority of working women (38.33%) purchased of ready to cook packaged food products from super market chains. This was followed by 34.17 per cent working women purchased of ready to cook food items from discount store and 27.50 per cent working women purchased from retail stores. In case of non-working women, 40.00 per cent were purchasing from discount stores, 34.17 per cent non working women purchased from retail stores and around one -fourth working women were purchasing from supermarket chains. It may be inferred that respondents were utilizing all three place of purchase of ready to cook packaged food products for their family consumption.

The results about frequency of Purchase of Packaged Food Products are mentioned in Table 3.

Data given in Table 3 show that maximum number of working (39.17%) and non-working woman respondents (37.50%) were purchasing packaged food products as per need for the family. This was followed by 26.67 per cent working women and 20.83 per cent non working women were purchasing packaged food products fortnightly.

Table 1: Place of purchase of ready to eat packaged food products

Place of Purchase	Working Women		Non-Working Women	
	f	Per cent	f	Per cent
Super Market Chains	36	30.00	40	33.33
Discount Stores	41	34.17	50	41.67
Retail Stores	43	35.83	30	25.00
Total	120	100	120	100

f = Frequency

Table 2: Place of purchase of ready to cook packaged food products

Place of Purchase	Working Women		Non-Working Women	
	f	Per cent	f	Per cent
Super Market Chains	36	38.33	31	25.83
Discount Stores	41	34.17	48	40.00
Retail Stores	33	27.50	41	34.17
Total	120	100	120	100

f = Frequency

Table 3: Frequency of purchase of packaged food products

Frequency of Purchase	Working Women		Non-Working Women	
	f	Per cent	f	Per cent
Day by Day/Daily	0	0.00	0	0.00
In a week twice	2	1.67	12	10.00
In a week once	17	14.17	18	15.00
Fortnightly	32	26.67	25	20.83
Needed Whenever	47	39.17	45	37.50
When Occasions come	22	18.33	20	16.67
Total	120	100	120	100

f = Frequency

Table 4: Nature of purchase decision of packaged food products

Nature of Purchase Decision	Working Women		Non-Working Women	
	f	Per cent	f	Per cent
Impulsive Buying	28	23.33	22	18.33
Planned Purchasing	68	56.67	47	39.17
Both (Impulsive and Planned purchasing)	24	20.00	51	42.50
Total	120	100	120	100

f = Frequency

Around one-fifth respondents purchased food products at the time of any occasions come in the family. None of the respondents was observed in the daily purchasing category. Very few respondents were purchasing of packaged food products in twice a week or in a once a week.

The present findings are in line with the findings of Kubendran and Vanniarajan (2005) who concluded that mostly change in consumption pattern of packaged food is due to changes in food habits of each family members of society. If increase urbanization and income among urban women consumers, the percentage of income spent on consumption of packaged food products are increases. Mostly found urban women consumers prefer branded products compared to rural women consumers. Most important factors influencing purchasing decisions were quality, acceptability, door delivery of the products.

The nature of decision for purchasing of packaged food products are presented in Table 4.

Table 4 shows that majority of working women (56.67%) go for planned purchase for packaged food products, followed by 23.33 per cent respondents who were doing impulsive buying. In case of non-working women category, maximum number of respondents (42.50%) responded both kind of purchasing i.e. impulsive and planned purchasing. The present results are supported by the results of Perner (2010) who reported that urban woman consumer's attitude was simply as a composite of a consumer's beliefs, feelings and buying behavioural intentions towards some object within the context of marketing.

CONCLUSIONS

It can be concluded from the above results that working woman consumers were more aware, better knowledge and better purchasing decision and buying behavior regarding packaged food products.

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CONSTRAINTS ANALYSIS IN PARTICIPATION OF BENEFICIARIES IN MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE ACT (MGNREGA): A LITERATURE REVIEW STUDY

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ABSTRACT

The National Rural Employment Guarantee Act, 2005 (NREGA), also known as National Rural Employment Guarantee Scheme (NREGS), is Indian legislation enacted since AUGUST 25, 2005. NREGA was renamed as Mahatma Gandhi National Rural Employment Guarantee Act abbreviated as MGNREGA in October, 2009. Amidst the successful implementation of this act, there are many speculations that this act has many loopholes and the rural communities are facing many hurdles with some exploitation.The present review paper highlighted on the major constraints faced by the beneficiaries under MGNREGA. From the study it was found that employment of hundred days (per household per year) is too less in the present situation. Along with this low wage rate, delays in payment of wages, delay in payment of unemployment allowance are the major constraints faced by the beneficiaries. The study has also revealed that the socio-economic condition of the households regularly working under MGNREGA scheme is considerably poor in the rural area. The study also revealed that women beneficiaries are facing problems , as there is lack of child care facilities at the work site along with lack of sanitation and drinking water facilities.

INTRODUCTION

The National Rural Employment Guarantee Act, 2005 (NREGA), also known as National Rural Employment Guarantee Scheme (NREGS), is Indian legislation enacted since AUGUST 25, 2005. NREGA was renamed as Mahatma Gandhi National Rural Employment Guarantee Act abbreviated as MGNREGA in October, 2009. The MGNREGA provides a legal guarantee for one hundred days' employment in every financial year to any rural household whose adult members are willing to do unskilled manual work at the statutory minimum wage. This act was introduced with an aim of improving purchasing power of rural people, primarily semi or unskilled work to people living BPL (Below Poverty Line) and APL (Above Poverty Line) household whose adult members volunteer to do unskilled manual work in rural India. It attempts to bridge the gap between the rich and poor in the country. Roughly one third of stipulated workforce must be women. The scheme was started from February 2, 2006 in 200 most backward districts of the country. It was expanded to 645 districts during 2014-2015. The Act has been notified throughout the country with effect from April 1, 2008. MGNREGA is India's social security measure and labour law with an aim to guarantee the 'right to work'. The main aim of this scheme is to enhance livelihood security in all rural areas by providing the local rural community at least 100 days of wage employment to do unskilled manual work. World Bank in its World Development Report 2014 termed it as "stellar example of rural development'.

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is the largest ever public programme conceived and grounded in the

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human history. It is the most powerful initiative ever undertaken for the transformation of rural livelihoods. It goes beyond poverty alleviation and recognizes employment as a legal right. It creates the right to work. It is demand-driven. It has the potential to provide a 'big push' in Indian regions of distress. It is designed as a safety net to reduce migration by rural poor households in the lean period through days of guaranteed unskilled manual labour provided when demanded, at minimum wage on works focused on water conservation, land development and drought proofing. The unique feature of this programme is that it is the first ever law internationally, that guarantees wage employment at an unprecedented scale. (Gora et al., 2017).

Along with the above mentioned aim MGNREGA also aims at creation of durable assets such as canals, roads, ponds and wells in the area where this scheme is implemented. It is to be noted that employment is provided within 5 km of an applicant's residence and he/she is paid with an at least minimum wages. If the work isn't provided within 15 days of applying, the applicants are entitled with an unemployment allowance. This means that the employment under MGNREGA is a legal entitlement. Gram Panchayat implements the MGNREGA.

Thus to strengthen the effectiveness of any programme, constraints in its success needs to be identified. Amidst the successful implementation of this act, there are many speculations that this act has many loopholes and the rural communities are facing many hurdles with some exploitation.

An understanding of the constraints faced by the respondents may serve as a feedback to the planners, policy makers, extension personnel and development agencies to make suitable strategy in the implementation of the scheme. Looking to the above facts in the mind the present study entitled, "A review of the constraints in the implementation of MGNREGA scheme" was carried out with the following objective:

1) To review the research studies carried out regarding constraints perceived by the workers in the implementation of MGNREGA.

RESEARCH METHODOLOGY

The study is based on principally on secondary data published and unpublished sources like books, journal articles, magazine articles, reports, publications, unpublished M.Sc. (Ag.), Ph.D. (Ag.) dissertations and the World Wide Web.

Review of literature

Patel (2008) reported that most beneficiaries could not get employment within 15 days of written application for work, disbursement of wages beyond the weekly basis, lack of in availability of worksite facilities (drinking water, first aid, crèche) and most of them could not get a complete 100 days employment in a financial year.

Narayanan (2008) in his study found that childcare was a major problem for many of the women workers. The mothers with children below age three years faced most problems of child care when they worked for MGNREGA.

Khera and Nayak (2009) concluded there were inflexible social norms which prevented women from working outside the house. The researchers observed that in Uttar Pradesh and Bihar, the women were told that program was not for them. The second big hurdle was the lack of child-care facilities. The investigator did not find child-care facilities anywhere (except at two or three worksites, that too possibly as window dressing). The absence of these faculties was crippling for women, especially those with breastfeeding babies. Thirdly, the illegal presence of contractors at many worksites affected the availability of work and its benefits for women. At same worksites in Madhya Pradesh, contractors offered work only to young, able-bodied men. It was observed that worksites where contractors were involved, 35 per cent of women workers faced some harassment as against only 8 per cent at contractor-free worksites. Fourthly some states had productivity norms which were extremely stringent and the nature of work offered came in the way of participation of rural women. In Jharkhand the standard task for a day's work at the time of the

survey was digging 110 cubic feet, which was far beyond the capacity of a women worker. In other similar situations the nature of work offered under MGNREGA acted as a barrier to the participation of women. Fifthly, delayed payments came in the way of participation of poor women particularly in case of single women who could not afford to wait as they were the sole earners in the family. When the wages did not come on time, women workers were often forced to return to previous, less preferred forms of employment.

Roy (2010) revealed that the major constraints in the implementation of NREGA were; incomplete list of audit in each household, delay in receiving job cards, wrong date or no date recorded on the work application, selection of a low priority or in appropriate work. Favouring or discriminating against people in allocation of work, late payment of wages and various aspects of the programme carried out without the people's involvement.

Sundaram (2011) in his assessment of MGNREGA, identified confusion about the operational requirement of the act, absence of any grievance redress system and lack of independent monitoring system as the constraint to women participation in MGNREGA. The researcher noted that women workers faced problems in the form of verbal abuse, harassment and lack of child care facilities and these had an impact on their participation.

Sasi Kumar (2012) in his study observed the dilemma of young mothers in Ramanathapuram, Tamil Nadu who worked under the MGNREGA, even though it played a positive role in their lives. Serious issues in implementation such as lack of availability of crèches for mothers of young children and the continued illegal presence of contractors had acted as deterrents to involvement of women in MGNREGA.

Tiwari and Upadhyay (2012) studied the constraints faced by women in Faizabad district of Uttar Pradesh. The study revealed that women participation was affected by constraints such as non-cooperation of family members, too much workload, and domestic work neglect. No extra work undertaken due to fatigue and children left uncared at home. The worksite constraints faced by women were lack of safe drinking water. Lack of crèche facility, ex-gratia payment not given after injury and no shade during rest period. These together with operational constraints had a negative effect on participation rate of women.

Mohanty (2012) concluded that norms of religion and biases in distribution of job card, dominance of elite families, defective leadership and improper coordination among the stakeholders stood as hurdles in the participation of tribal women workers in MGNREGA.

Ali and Ahmed (2012) found the challenges in MGNREGA as low awareness and accessibility to the common person; delayed payment of wages from the concerned authority; a poor worksite facility is prevalent all over; asset creation has not been so evident because in many cases the works are left incomplete due to lack of awareness and proper management of available funds; the workers continue to face difficulties in having proper job cards and in several cases they had to pay for processing job applications; shortage of staff and delay in appointments due to lack of management; disruption due to imposition of election code of conduct; unsolicited fees being charged for work application forms; denial of registration to the uneducated people.

Nayak (2013) found that in Rajgangpur Block of Sundergarh district of Odisha the involvement of tribal women in MGNREGA program was marginal and where they were involved they were a subject of exploitation. The study highlighted the existence several bottlenecks like lack of tribal women involvement at the planning stage of the work. lack of crèche facilities at worksites, low level of awareness, lack of women's ownership of job cards and bank accounts, wage discrimination between men and women, harassment at the workplace and lack of appropriate gender friendly methods of information dissemination. The researcher was of the view that MGNREGA needed to address

governance lapses, sensitized the implementers of the scheme and provide free legal assistance to the beneficiaries who were deprived of their entitlement in order to be effective.

Arora *et al*., (2013) in their research found that with the exception of provision for drinking water other worksite facilities like crèche, resting place, first-aid, recreational facility for children and other facilities for the betterment of gender were absent at the worksites. The double load of work inside and outside the house led to increase in working hours and acted as deterrent to participation in MGNREGA. Delay in wage payment was a hindrance particularly for single women, who could afford to wait as they were the only earners in the family. When these single earner women did not get wages in time, they were bound to return to previous, less preferred job. This delay in wages was due to long process of release of money after submission of the completion report of every project by area engineer. Another constraint was the introduction of wages payments through banks. When a single account was opened per job card the account was mostly opened in the name of a male member of the family. This meant that women were dependent on men to withdraw their income. The awareness about MGNREGA entitlements among the women workers was very low. In addition to that since a beneficiary was neither getting 100 days of work nor unemployment allowance so there was no attraction for women to join the work under the Scheme.

Borah and Bordoloi (2014) conducted a study which found agreement with the CAG Report, 2007 which had singled out that lack of dedicated administrative and technical staff for MGNREGA as the key constraint responsible for procedural lapses. The other major shortcoming of the Act was the non-availability of child care facilities at the work site even though the Act includes this provision Women remained worried about their children while they are working at the worksite and some women did not accept the job because of non-availability of proper child care facilities. From the survey it was found that except drinking water facility all other facilities were generally absent. Delay in payments was also responsible for poor participation of women particularly in case of single women if they were the main earners in the family. In Assam women participation was low because of low level of awareness about the process and entitlements of the programme. Many of the male folks had withdrawn from agricultural activities and joined work in MGNREGA and the vacant space in agriculture has been taken over by the women.

Bishnoi *et al*., (2015) concluded that the major constraints observed by rural women were illiteracy, difficulty in filing form and completing complex procedure of registration, laborious nature of work for women, low wage rate, unnecessary delay in wage payment, more job card and less employment, elite group within workers capturing most of job card and lack of child care facility.

Farooqi and Saleem (2015) found that the erratic work pattern and low awareness about MGNREGA provisions made it a weak proposition for women participation. The restrictions from family head because of social and religious taboos, work load on own land and care for cattle, unavailability of guaranteed 100 days of employment and payment of unemployment allowance were the other strong constraints withholding women participation. Low wage rate in MGNREGA, rare availability of work and very short days of employment for women were also the issues that hindered the participation of women in MGNREGA. Some women respondents also reported that working under MGNREGA involved harder manual labor than working in farms in the study area.

Mudliyar and Ghorude (2016) observed that the reasons for the low participation of women in MGNREGA were family problems, religious and social restrictions, availability of easier alternate employment opportunities, inefficiency of Panchayat in providing 100 days of employment, higher income from other sources and absence of unemployment allowance.

Bahuguna *et al.*, (2016) in their survey found that the there exist several gaps which are creating

hurdles in proper implementation of the MGNREGA programme. These gaps act as barriers in proper implementation of the scheme and thus restricts the outreach of the programme. The main bottlenecks are listed as:Lack of awareness amongst rural masses, improper coverage area of the programme, inability to identify right people as beneficiaries, no performance assessment of employees working in MGNREGA, lack of coordination amongst different agencies and scarcity of funds, formulation and design of programme, lack of work professionalism amongst MGNREGA employees and perception of beneficiaries regarding transparency and judicious use of funds

Gora *et al.*, (2017) in their study revealed that the most important problems faced by the women workers were "Children left uncared" (83.33 MPS) followed by "Domestic work neglected" (81.66 MPS) as personal and family problems. Regarding operational problems, the most important problems faced were "Delay in issuing job card" (79.44 MPS), "Huge delay in work payment" (77.77 MPS) and "Wages not provided according to MGNREGA act". The problems on worksite, the most important problems facedc by the women workers were "Lack of safe drinking water" (73.38 MPS) "and "No shade during rest period" (72.77MPS).

Arunrao *et al.*, (2018) in their study noted that the constraints faced by beneficiaries in MGNREGA were: Employment of hundred days (per household per year) is too less in the present situation (91.66 percent), lack of medical facilities near the work site (79.16 percent), continuous work is not provided (70.83 percent), low wage rate (66.66 percent), delay in payment of wages (64. 16 percent), non availability of supporting staff (63.33 percent), same wage rate is given for all kinds of work (60.83 percent), unemployment allowance is not provided in case of delay in job (59.16 percent), difficulties in withdrawal of payment from bank (56.66 percent) and wages are not provided according to MGNREGA act (51.66 percent).

Archana *et al.*, (2019) in their study revealed that the major problems perceived by the beneficiaries were late payment of wages, no opportunity to get employment more than 100 days and non-provision of 100 days work. The major problems perceived by the stakeholders were illiteracy of people, non-availability of staff, lack of cooperation and conflicts between people, non-availability of fund in time, limited work activities under MGNREGS which may not available at village level.

Rekha and Mehta (2019) found that comparatively backward ethnic groups are regularly participating in larger proportions in the MGNREGA works, whereas general and other backward caste people also constitute the larger share. The traditional concept of joint households in rural areas is being disturbed due to implementation of the programme as a proportion of the job cards are held by smaller size of households is equal to large size. The education level of the beneficiaries has been found to be lower. The study has revealed that the socio-economic condition of the households regularly working under MGNREGA scheme is considerably poor in the rural area. They are the really needy people. Though the socio-economic conditions have been improving gradually, but to fasten the rate of improvement some developmental initiative can be integrated with the scheme mainly targeting those households who are working regularly under the scheme for long periods.

Goyal and Datta (2020) identified the constraints that lack of childs care, nature of work, social norms, illegal presence of contractors, delay in payment and lack of involvement of women in planning stage were the main constraints that have limited the participation of women in the scheme.

CONCLUSION

No doubt that MGNREGA is one of the largest running social upliftment schemes in the world that our country has undertaken. It is also to be noted that the government is striving hard to make sure that this programme is being implemented barrier free. At the same time it is known that no schemes are hundred percent barriers free, above mentioned review findings are the proofs that point at minor

and some major lacunae that workforce or beneficiaries' are facing in the limelight. Few steps can be undertaken to mitigate the barriers as much as possible. The success of the programme usually depends upon its proper implementation. From the reviews collected it was found that prevailing wages are not sufficient, so the Government should look after the wages increase and also increase in number of wage days. Along with these women workers should have provision of childcare facilities, sanitation facilities.

Thus, there should be continuous efforts towards building ample awareness on different provisions of MGNREGA amongst the people. Creating awareness is important not only to stimulate the people, workforce or beneficiaries to work under the scheme, but also to trigger them to participate in its planning and implementation. It is also to be jotted down that Investment should be patronized in such a way that activities should provide benefits at the community level so that the poor will derive maximum benefits.

There should also be a provision for the social audit at Panchayat level to look after the money which is siphoned off by the corrupt middlemen. Increasing health insurance scheme under this programme will also raise security thresholds of the beneficiaries. Selection of beneficiaries for this scheme should be target oriented particularly place which is drought prone area and place which has more backward population.

Limitations of the study and scope for future research

The present study is based on secondary sources of data collected from various reviews nationally and internationally. The results of review papers may not help to take important managerial decision as the studies have been done in selected areas of the country and we cannot generalize the outcomes of the studies. The scope for future study is that the researcher need to conduct a dis-aggregate level of investigation to understand the level of awareness about the provisions, area of problems during implementation of the scheme and finally an evaluation of measures undertaken to understand whether the roadblocks of the past have been removed and new ones are not been allowed to take roots.

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