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Indian Journal of Extension Education and Rural Development

FROM EDITOR'S DESK

We are delighted that 24th volume (year 2016) of the Indian Journal of Extension Education and Rural Development is all set to go to print. There are 48 research papers included in this volume covering variety of aspects of rural life.

Adoption of technologies, Knowledge assessment, Impact assessment and Training need assessment are the major domains of conducting research in Extension Education and will remain important in future also. I am extremely happy to note that this volume of the journal is consisting of very current concepts like unemployment and remedial measures, Pesticide use behavior, Farmers' Field School, Public Private Partnership, Job satisfaction and Job performance of Extension workers, Protected cultivation, Food security and communication credibility. It is really heart-warming to see all these contributions. The editorial Board appreciates the time and effort that have been devoted by the different contributors and would like to thank them all.

In case of social science the measurement tools are very important which enhances the quality of research. I urge the researchers to pay more attention in developing the standardized scientific tools if possible in future researches.

I am extremely grateful to Prof. P.N. Kalla, President and Prof. N.K. Punjabi, Secretary of Rajasthan Society of Extension Education for their valuable guidance in publication of the journal. I am also thankful to the executive council, editorial board and reviewers for their valuable assistance in publication of the journal.

My special thanks to Dr. F.L. Sharma, Professor & Head, Department of Extension Education, Dr. S.S. Sisodia, Professor of Extension, R.C.A., Udaipur for their untiring efforts in bringing out publication of the journal.

Suggestions and criticisms towards improving the journal are always welcome.

Looking forward for continued co-operation and contribution for the coming issue of the journal.

S.K. Sharma
Chief Editor



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EFFECTIVENESS OF TRAINING PROGRAMME ON PUBLIC-PRIVATE-PARTNERSHIP UNDER EXTENSION REFORMS

P. Das*

ABSTRACT

The considering the importance of Public-Private- Partnership, Extension Education Institute, Jorhat (N E Region) started conducting training programmes on Public-Private-Partnership since 2005 and conducted 7 numbers of training programmes and trained 122 numbers of middle level extension functionaries of agriculture and allied departments. Therefore, a study was undertaken to measure the effectiveness of the training programme on Public- Private-Partnership under extension reforms conducted by Extension Education Institute, Jorhat. A purposive sampling technique was followed for selection of the above subject matter area of training. Two states namely Assam and Nagaland were selected for the present study. A total of thirty six numbers of respondents were selected for conducting the study. The results revealed that the training programme was moderately useful for the trainees and also the level of knowledge gained was found to be moderate for them. Findings of correlation analysis on the training programme showed that educational qualification and work experience had positive and significant correlation with effectiveness of training programmes.

INTRODUCTION

Public-Private Partnership is a collaborative arrangement between public, private, and/or civil sector entities under which each party contributes to the planning, resources, and activities associated with accomplishing a mutual objective, while at the same time sharing in the associated risks and benefits. Partnerships in agricultural innovation often arise from the need for an interactive exchange of information related to knowledge and technologies underlying innovation (Alcorta, Rimoli, and Plonski 1997).

Public-Private Partnerships in agricultural research and development are increasingly viewed as an effective means of conducting advanced research, developing new technologies, and deploying new products for the benefit of small-scale, marginal and resource-poor farmers in developing countries. It includes agricultural research institutes, extension agencies, universities, producer organizations, farmer associations, cooperatives, and local governments, as well as many other entities.

Therefore keeping all these in view and considering the importance of Public Private

Partnership, Extension Education Institute (N E Region) started conducting training programmes on Public private partnership from 2005. From 2005, the institute had conducted 7 numbers of training programmes on public private partnership and had trained 122 numbers of middle level extension functionaries of agriculture and allied departments.

Hence this study was planned to measure the effectiveness of the training programmes in Assam and Nagaland from 2005-06 to 2008-09. It aimed to measure effectiveness of EEI's training programme on Public Private Partnership under extension reforms in terms of perceived usefulness and knowledge gained by the trainees as a result of training programmes. The study revealed a clear picture about the impact or actual learning and changes that had taken place at the field level.

RESEARCH METHODOLOGY

The present study was conducted in two north-eastern states namely Assam and Nagaland. A total of thirty six numbers of respondents were selected for the present study. All the respondents were middle level extension functionaries of sub divisions and blocks of the department of agriculture, veterinary

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and animal husbandry, fishery and sericulture. Apart from them, trainers from KVKs, SAMETIs and NGOs were also act as respondents. The aspects covered in this study are measuring the perceived usefulness and knowledge gained and also application of the learning from the training programme and changes taken place. The perceived usefulness was measured with a scale having twelve (12) items which was administered to the respondents on a three point continuum i.e. 'Very Much Useful', 'Useful' and 'Not at all Useful'. The scores assigned to three categories were 3, 2 and 1 respectively. The extent of knowledge gained was measured with a scale having sixteen (16) items which was administered to the respondents on a three point continuum i.e. 'Very Much gained', 'Gained' and 'Not at all gained'. The scores assigned to these categories were 3, 2, and 1 respectively. The data on usefulness and knowledge gain were ranked with the help of Weighted Mean Score (WMS). Open-ended questions were asked to assess the application of the learning and changes taken place from the training programme. 6 (six) independent and 1 (one) dependent variables were selected for the present study. Data were collected with the help of mailed questionnaire followed by personal visit.

RESULTS AND DISCUSSION

Effectiveness of training programme in terms of perceived usefulness and knowledge gained

In order to assess the effectiveness of training programmes, the data were analyzed at nominal level. The frequency and percentage analysis were find out, 2 dimensions, viz., perceived usefulness and knowledge gained were selected. The findings pertaining to each dimension along with relevant discussion are presented below:

Data presented in Table 1 shows that 55.55 per cent of the trainees perceived the training programme as moderately useful followed by 44.44 per cent of the trainees who found it less useful. There was not a single participant who found it highly useful. Moreover, majority of the participants (44.44 %) considered their level of gain in knowledge as moderate as a result of the training programme. There were 30.55 per cent of the trainees perceived the training programme as highly helpful followed by 29.00 per cent of the participant who found it less helpful for their work situation.

Data presented in Table 2 reveals the effectiveness of training programme in terms of perceived usefulness. The topic on 'Importance of private extension' was ranked first (WMS=3.88) followed by the topic on 'Identification of the needs of farmers' (WMS=2.97). The topic on 'Problems of public extension' (WMS=2.91) was ranked third.

Moreover, the topics on 'Identification of different types of contract farming', 'Understanding the concept of partnership', 'Understanding the difference between private and privatization', 'Understanding the reasons behind private extension', 'Understanding the concept of contract farming', 'Understanding the concept of economic empowerment', 'Understanding the concept of World Trade Organization', 'Understanding of policy framework for agricultural extension' and 'Understanding the objectives and functions of World Trade Organization' were ranked fourth, fifth, sixth, seventh, eighth, ninth, tenth and eleventh respectively.

Data presented in Table 3 shows the effectiveness of training programme in terms of perceived

Table 1. Effectiveness of the training programme in terms of perceived usefulness and knowledge gained

S.No.	Characters	Category	Score range	Frequency and percentage	Mean	S.D & C.V
1.	Usefulness	Less useful	Below 28.7	16(44.44)	29	0.28 & 0.96
		Moderately useful	28.7 to 29.2	20(55.55)		
		Highly useful	Above 29.2	0(0)		
2.	Knowledge gained	Less gained	Below 69	9(29)	76	6 & 7.89
		Moderately gained	70 to 82	16(44.44)		
		Highly gained	Above 87	11(30.55)		

Table 2. Effectiveness of the training programme in terms of perceived usefulness

Sl. No	Dimensions/Topics	WMS	Rank
1.	Importance of private extension	3.88	I
2.	Understanding the reasons behind private extension	2.38	VI
3.	Understanding the difference between private and privatization	2.77	V
4.	Understanding of policy framework for agricultural extension	2.11	X
5.	Understanding the concept of partnership	2.77	V
6.	Identification of the needs of farmers	2.97	II
7.	Understanding the concept of economic empowerment	2.27	VIII
8.	Understanding the concept of World Trade Organization	2.16	IX
9.	Understanding the objectives and functions of World Trade Organization	1.83	XI
10.	Understanding the concept of contract farming	2.30	VII
11.	Identification of different types of contract farming	2.83	IV
12.	Problems of public extension	2.91	III

Table 3. Effectiveness of the training programme in terms of perceived knowledge gained

Sl. No	Dimensions/Topics	WMS	Rank
1.	Private extension	2.88	VII
2.	Difference between private extension and privatization	2.91	VI
3.	Meaning and concept of private extension	3.88	II
4.	Attitude and preferences of scientist about private extension	2.63	IX
5.	Attitude and preferences of farmers about private extension	2.61	X
6.	Factors for privatization of Agri. Extension services in India	3.11	III
7.	Policy framework for agricultural extension	2.44	XIII
8.	Changing role of agricultural extension	2.27	XV
9.	Advantage and disadvantage of partnership	2.58	XI
10.	Concept of World Trade Organization	2.30	XIV
11.	Relationship between World Trade Organization and global agricultural trade	1.83	XVII
12.	History and evolution of World trade Organization	2.11	XVI
13.	Objectives and functions of World Trade Organization	1.83	XVII
14.	Concept of contract farming	2.47	XII
15.	Types of contract farming	4.22	I
16.	Activities/ areas of PPP		
	(a) Problems in public extension	3.05	IV
	(b) Individual and private organization	2.11	XVI
	(c) Advantages of PPP	2.91	VI
	(d) Areas of public and private partnership in extension	2.47	XII
	(e) Working guidelines	2.44	XIII
	(f) Dimensions	2.30	XIV
	(g) Dimensions related to World Trade Organization	2.11	XVI
	(h) Managerial function	2.88	VII
	(i) Resources	2.30	XIV
	(j) Partnership and kinds of partnership	2.63	IX
	(k) Training and types of training	2.83	VIII
	(l) Methods of training	2.97	V

knowledge gained. The topic on 'Types of contract farming' was ranked first (WMS=4.22) followed by the topic on 'Meaning and concept of private extension (WMS=3.88). The topic on 'Factors for privatization of Agri. Extension services in India' (WMS=3.11) was ranked third.

Moreover, the topic on 'Problems in public extension' was ranked fourth followed by the topic on 'Methods of training'. The topics on 'Difference between private extension and privatization' and 'Advantages of PPP' both were ranked sixth. The topics on 'Private extension' and 'Managerial function' both were ranked seventh followed by the topic on 'Training and types of training'. Topics on 'Attitude and preferences of scientist about private extension' and 'Partnership and kinds of partnership' both were in ninth position followed by the topics 'Attitude and preferences of farmers about private extension', 'Advantage and disadvantage of partnership', 'Concept of contract farming', 'Areas of public and private partnership in extension', 'Working guidelines' who were ranked tenth, eleventh, twelfth, thirteenth respectively. The topic on 'Concept of World Trade Organization', 'Dimensions', 'Resources', all were in the rank of fourteenth followed by the topic on 'Changing role of agricultural extension' which was ranked in fifteenth position followed by the topics on 'History and evolution of World trade Organization', 'Individual and private organization' and 'Dimensions related to World Trade Organization' were ranked in sixteenth position which was followed by the topics on 'Relationship between World Trade Organization and global agricultural trade' and 'Objectives and functions of World Trade Organization' were ranked seventh by the trainees.

Assessment of the application of the learning from the training programme

In order to assess the application of the training programme, open ended questions were asked. The responses to the open ended questions were properly analyzed, coded and worked properly. The responses were ranked on the basis of frequency percentage of the respondents.

The findings from the Table 4 shows that "helping in conducting training programmes on contract farming" was the major application of the training

programme as mentioned by majority (91.26 %) of trainees. Being a new concept, to make people aware of it, the trainees periodically started conducting training programmes on it in their work places. Also, it was revealed that the second major application was "helping in identification of different types of contract farming" as indicated by 85.71 per cent of the trainees.

Helping in conducting training programmes on the concept of public-private partnership was the third major application as mentioned by 69.04 per cent of the trainees (Table 4).

Assessment of the changes that had taken place as a result of the training programme

A number of changes had taken place in the actual job situation of the trainees after going through the training programmes. To identify the changes, open ended questions were asked. The responses to these open ended questionnaires were analyzed, coded and properly worded. The changes were ranked on the basis of frequency percentage of responses of the respondents.

The first major change that has taken place was active participation of farmers in training programmes as mentioned by 94.44 per cent of the trainees as shown in Table 5.

The second major change that has taken place was increase in number of contract farming in small scale basis in villages which was observed by 67.46 per cent of the trainees. By knowing the benefits of contract farming, the farmers start involving in contract farming (Table 5).

Relationship between training effectiveness with socio personal and psychological characteristics of participants

The findings of correlation analysis presented in Table 6 shows that there is positive and significant correlation of educational qualification ($r=0.342^*$) and work experience ($r=-0.321^*$) with knowledge gained and usefulness of the training programme at 5 per cent level of probability respectively. This finding indicates that as there is increase in educational qualification and work experience of the participants, the effectiveness of the training programme increases.

Table 4. Assessment of the application of the learning from the training programme

S.No.	Application	Frequency	%	Rank
1	Helping in conducting training programme on contract farming.	115	91.26	I
2	Helping in identification of different types of contract farming.	108	85.71	II
3	Helping in conducting training programme on the concept of public private partnership.	87	69.04	III

Table 5. Assessment of the changes taken place as a result of training programme

S.No.	Changes taken place	Frequency	%	Rank
1	Active participation of farmers in training programmes.	119	94.44	I
2	Increase in number of contract farming in small scale basis in villages.	85	67.46	II

Table 6. Relationship between training effectiveness with selected socio personal and psychological characteristics of participants

S.No.	Variables	Usefulness		Knowledge gained	
		'r' value	't' value	'r' value	't' value
1	Age	-0.002	0.014	0.075	0.044
2	Educational qualification	-0.050	0.292	0.342*	2.274
3	Gender	-0.016	0.097	-0.070	0.410
4	Work experience	0.321*	2.142	0.101	0.597
5	Training exposure	0.194	1.159	-0.132	0.777
6	Achievement motivation	0.095	0.559	0.032	0.184

It can be further seen from the analysis that age, gender, training exposure and achievement motivation had no significant correlation with effectiveness of the training programme. Hence it may be concluded that age, gender, training exposure and achievement motivation have no relationship with the effectiveness of the training programme.

CONCLUSION

The study revealed that the level of effectiveness of the training programme was found to be moderate in terms of its perceived usefulness and knowledge gained. It is also observed from the study that none of the participant perceived it as highly useful.

Moreover the skill based areas in the training programme was missing which is a very important aspect of any training programme. So the skill based areas of the training programme on public private partnership should be identified by the institute and give more emphasis so that the trainees can easily

utilize those in their respective organizations.

Regarding the application of the learning of the training programme, only few applications of the learning that had been taken place in both the states, which are also not up to the mark as envisaged. Thus, it indicates that the training institute as well as home organization of the trainees should give more emphasis on conducting training need assessment before selecting a candidate for a training programme. The follow-up mechanism of the institute should also be strengthened. Besides, the climate of the organization to which the participants belong should be made more congenial so that trainees can utilize their learning in order to increase organizational effectiveness.

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KNOWLEDGE LEVEL OF FARMERS ABOUT DRIP IRRIGATION SYSTEM IN BIKANER DISTRICT OF RAJASTHAN

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ABSTRACT

The present study was conducted in four panchayat samities (out of six) in Bikaner district of Rajasthan. From the selected four panchayat samities, a total of 234 respondent farmers having drip irrigation system were selected randomly for the study purpose. The data were collected by personal interview method. The study revealed that majority of (63.68 per cent) the respondents had medium knowledge level followed by 22.22 per cent and 14.10 per cent respondents had low and high knowledge level about drip irrigation system, respectively. Further, it was observed that the respondents had highest knowledge about the aspect of 'suitability of drip irrigation system' (88.03 MPS) followed by 'installation of drip irrigation system' (81.97 MPS). The respondents had least knowledge about the 'maintenance aspect of drip irrigation system' (71.93 MPS) in the study area.

INTRODUCTION

Drip irrigation system saves 40-70 per cent water as compared to surface irrigation method and reduces labour cost, protects the plants from diseases by minimizing humidity in atmosphere. Soluble fertilizer can also be applied with irrigation water. Thus, drip irrigation has become a means of hi-tech agriculture, horticulture and precision farming. The technology has the potential to really double the area under irrigation through judicious use of water with efficiency as high as 80-90 per cent as compared to 30-50 per cent in case of surface irrigation.

Rajasthan is such a state where water scarcity is a major problem for farming, sandy soils cover a major part of the state and topographically is undulating type. Due to arid and semi arid climate *i.e.* negative moisture index, poor soil quality and traditional agriculture practices, the food security, nutritional security, sustainability and profitability of horticulture production system is still a distant dream in the state. Irrigation scenario of Rajasthan is characterized by erratic or scanty rainfall, dwindling ground water resources increasing alternative demand of municipal and industrial sector that means less water available for agriculture. In these situations drip irrigation technology is prime importance in the state. Considering the importance and scope of drip

irrigation system the present investigation entitled 'Knowledge level of farmers about drip irrigation system in Bikaner District of Rajasthan' was under taken.

RESEARCH METHODOLOGY

The present study was conducted in Bikaner district of Rajasthan. Out of six, four panchayat samities were selected purposely on the basis of highest area and large number of beneficiary farmers of drip irrigation system. From the selected four panchayat samities 25 per cent farmers having drip irrigation system were selected randomly. Hence, total sample of 234 respondent farmers were selected for the study purpose.

The data were collected by personal interview method with the help of interview schedule. The data so collected were tabulated and analyzed. Inferences were drawn after subjecting the data to statistical analysis.

RESULTS AND DISCUSSION

Based on the knowledge scores obtained from the respondents, the mean score and standard deviation were computed and the respondents were classified in to three categories on the basis of mean value (33.00) and standard deviation (4.00). These three

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categories of respondents were as presented below:

- (i) The respondents who obtained score below 29 were categorized as having low knowledge level.
- (ii) The respondents who obtained score from 29 to 37 were categorized as having medium knowledge level.
- (iii) The respondents who obtained score above 37 were categorized as having high knowledge level.

The statistical data regarding the knowledge level of farmers about drip irrigation system were presented in Table 1.

Table 1. Distribution of respondents according to knowledge level about drip irrigation system
n=234

No.	Knowledge level	Frequency	%
1	Low (score below 29)	52	22.22
2	Medium (score from 29 to 37)	149	63.68
3	High (score above 37)	33	14.10
	Total	234	100.00

Mean 33.00, S.D. 4.00

The data in Table 1 revealed that 22.22 per cent, 63.68 per cent and 14.10 per cent respondents fell under the categories of low, medium and high level of knowledge about drip irrigation system, respectively.

From the findings it could be observed that majority of the respondents had medium knowledge level regarding drip irrigation system. The medium knowledge level might be attributed to their less exposure to information sources, less contact with the extension personnel and proper continuous technical guidance might not be provided by the agencies working for transfer of technology in the study area.

Aspect wise knowledge level of farmers about drip irrigation system

The different aspect wise knowledge level of farmers about drip irrigation system was also analyzed separately. The relative knowledge possessed on all the five aspects of knowledge about

drip irrigation system were highlighted by ranking them in descending order on the basis of mean per cent score of knowledge level. The data have been presented in Table 2.

Table: 2 Aspect wise knowledge level of farmers about drip irrigation system
n=234

No.	Knowledge aspects	MPS*	Rank
1	Suitability of drip irrigation system	88.03	I
2	Installation of drip irrigation system	81.97	II
3	Operational aspect of drip irrigation system	74.87	IV
4	Technical aspect of drip irrigation system	81.62	III
5	Maintenance aspect of drip irrigation system	71.93	V
	Overall knowledge	79.68	

*MPS= mean per cent score

The figures contained in Table 2 revealed that the respondents had highest knowledge about 'suitability of drip irrigation system' (88.03 MPS) and this aspect was assigned ranked first. The second highest rank was accorded to 'installation of drip irrigation system' (81.97 MPS), followed by 'technical aspect of drip irrigation system' (81.62 MPS) and 'operational aspect of drip irrigation system' (74.87MPS) which were assigned ranked third and fourth, respectively. Whereas, 'maintenance aspect of drip irrigation system' (71.93 MPS) was found in last position of knowledge level of farmers about drip irrigation system.

The critical analysis of all the knowledge aspects, it can be concluded that that the respondents had highest knowledge about the aspect of 'suitability of drip irrigation system'. This might be due to the fact that additional area can be irrigated by drip irrigation system due to saving of water, because of smaller quantity of water is applied to the soil by drip irrigation system and it is suitable for all type of vegetables and fruit crops grown in sandy and light soil types in water scarcity areas. Hence the farmers are seemingly very well convinced about it. Second

rank was awarded to aspect 'installation of drip irrigation system'. This might be due to the fact that the farmers were well versed about installation of drip irrigation system, subsidy provision and installation cost of drip irrigation system. The transfer of technology agencies might have paid more attention and convinced the farmers regarding the benefits of drip irrigation system in the area.

Farmers had little knowledge about the technical, operational, and maintenance aspects of drip irrigation system. This might be due to the reason that the farmers were less aware about these aspects, because after installation of drip irrigation system the proper technical guidance about such aspects might have not been provided by the drip installation agencies.

The findings of the study are in line with the findings of Jitarwal and Sharma (2007), Singh and Dangi (2010), Bunker *et al.* (2012), Patel *et al.* (2012) and Gauttam *et al.* (2014) who reported that majority of the farmers had medium level of knowledge about drip irrigation system.

CONCLUSION

From the above findings it can be concluded that majority of the farmers were having medium level of knowledge about drip irrigation system. Further the respondents had highest knowledge about the aspect of 'suitability of drip irrigation system' followed by 'Installation of drip irrigation system'. Whereas the farmers had little knowledge about the technical, operational and maintenance aspects of drip irrigation system in the study area due to the reason that the farmers were less aware about these

aspects because after installation of drip irrigation system the proper technical guidance about such aspects might have not been provided by the drip installation agencies.

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A COMPREHENSIVE STUDY ON CREDIT ORIENTATION BEHAVIOUR OF SHG WOMEN

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ABSTRACT

The present study attempts to carry out a comparative study on NGO promoted and government promoted SHGs on credit orientation behaviour of the rural women. A total sample of 240(120 from Government promoted groups, 120 NGO & Government promoted groups) respondents from 240 groups were selected for the study. Results revealed that majority of the SHG women had received less number of loans followed by average number of loans, received loans from IKP and were repaying loans regularly through the income gained from the loan investment, loans were mostly utilized for their children education, to clear old debts and to start up a new business.

INTRODUCTION

Credit is one of the important inputs for rural development. Rural credit helps in reducing poverty by providing the poor with credit facility to start a small business. It not only supports the economic condition of the poor people but also has positive impacts on their social life through better standard of living with greater access to education and health facilities and empowerment to participate in decisions of the society. We have multi agency rural credit delivery structure such as commercial banks, regional rural banks, cooperative banks, district rural development agency, cooperatives, NGOs and land development banks to dispense adequate credit at cheaper rates. There are more than 153,000 retail credit outlets (one for every 4100 population) to deliver credit for poverty alleviation (Srinivas Rao, 2011). Self-Help Groups (SHGs) have emerged to fill the gap in the formal credit system because the formal credit delivery mechanism has not only proven inadequate but has also not been fully integrated into the overall rural social and community development.

A massive expansion is underway in SHGs in India. The cumulative progress indicates that 74 million SHGs, with an estimated membership of 197 million poor people touching 97 million rural households directly becoming part of this great movement. The movement which started as a link between the “unbankable” rural poor and the formal banking system to cater to the microcredit needs of

the poor, now boasts of a group savings of a whopping `330001 crores (70% of which goes for internal lending and the balance in the SB accounts of the groups), from a very miniscule proportion of total bank credit to a credit outstanding of `43000 crores (excluding nearly `23000 crores lent to members from groups' own savings). With over 84 per cent of these being all women groups, the poor rural women in India now controls a financial business with turnover of nearly `1,00,000 crore (deposits + credit) – much more than most of the MNCs in India! (NABARD, 2014.). As of 31 March 2014, there were 74.30 lakh saving linked SHGs with a bank deposit of Rs 9897 crore and 41.97 lakh credit linked SHGs with bank loan outstanding of Rs 42928 crore. During 2013-14, 13.66 lakh SHGs were provided credit assistance amounting Rs 24017 crore by banks. Now all the commercial banks are treating SHGs as their instant source of business and expanding credit at micro level for their consumption and productive purpose. 7.4 million SHGs With all this reviews a study was employed with a prime objective to study the credit orientation behaviour of the SHG women.

RESEARCH METHODOLOGY

Ex-post facto research design was adopted in the present investigation. All the three regions of united Andhra Pradesh (Telangana, Coastal Andhra and Rayalaseema) were selected for the study and from each region one district was selected purposely based on highest number of SHGs. Accordingly, Nalgonda district from Telangana, East Godavari District from

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Coastal Andhra and Chittoor district from Rayalaseema were selected. From each district two Mandals were selected based on the availability of NGOs in the Mandal. Two villages were selected from each Mandal which are of having more than 20 groups in it. One village solely promoted by the government SHG's and second village being supported/promoted by the NGO, thus making a total of 4 villages from each district and 12 villages from the state. 20 respondents from each village were chosen for the study, thus making a total sample of 240(120 from Government promoted groups, 120 NGO promoted groups) respondents from 240 groups. A scale was developed and standardized using Scalogram analysis to collect the data through personal interview. Statistical procedures like frequency, percentage, range and Z test were employed to analyse and interpret the data.

RESULTS AND DISCUSSION

A schedule was developed to quantify the credit orientation behaviour of the SHG women of the both NGO promoted and government groups. Credit orientation behaviour in the present studied with a set of various components like number of times the respondent availed the loan from self help group, source of the loan amount timely repayment of the loan, source of the repayment amount and the purpose for which the loan amount has been utilized by the women.

Credit Received

Based on number of times the group had received the loan the respondents were categorized into less, average and more.

It could be vividly seen from the Table 1 that 55.83 per cent of the respondents has received less

number of loans followed by average number (35.00%) and 9.17 per cent had taken more number of loans.

Nearly three fourth (74.17%) of the respondents in the government promoted SHGs had taken less number of the loans followed by average (25.00%) and more (0.83%) number of loans. Where as in NGO promoted SHGs majority (45.00%) of the respondents had received average number of loans followed by less (37.50%) and more (17.50%) number of loans.

From the above results it could be perceived that majority of the SHG women received loan on an average of 1-4 times. It was also observed that NGO SHG women received more number of loans compared to government promoted SHGs as they were availing the loans from the government as well as from the promoting NGOs. The frequency of getting loans was less because the new sanction of new loan depends on time taken by the women to repay the old debt, confidence, credibility of the bank officials towards their group, savings amount of the group to get the loans from the bank to acquire a new loan. The bank officials were looking all the scenario of the group including the savings, repayments of the loan, repayment period, loan utilization, group response to meeting in before sanctioning a new loan. Hence very few groups were receiving more frequent loans as compared to the other groups.

Sources of Credit

Based on the available sources of the credit SHGs usually get, they were categorized into 4 categories and distribution of the respondents were given in the table 4.12.

An overview of the Table 2 states that near to the half (52.92%) of the respondent received IKP loan

Table 1. Distribution of respondents according to the number of loans received

S.No.	Credit Received	Government(n=120)		NGO(n=120)		Total(n=240)	
		f	%	f	%	f	%
1	Less (1-4)	89	74.17	45	37.50	134	55.83
2	Average (5-8)	30	25.00	54	45.00	84	35.00
3	More (9-12)	1	0.83	21	17.50	22	9.17
Total		120	100	120	100	240	100

followed by the NGO+ IKP loan (40.83%) , IRDP (5.42%) and very few (0.83%) respondents received loans only from the NGO.

In the government promoted SHGs most (89.17%) of the women got the IKP loan followed by the IRDP loans (10.83%). In respect to the NGO promoted SHGs maximum (81.67%) number of the respondents received loans from both the NGO and

IKP sector followed by the IKP loans (16.67%), NGO loans (1.67%) and none of them found to be received IRDP loans.

It could be predicted from the above results that government promoted groups were getting loans only from the government schemes and its was also noticed that none of the selected government promoted SHGs in all the three districts were not receiving any kind of the credit assistance from the NGO. While in NGO promoting SHGs most of the self-help groups were getting more benefitted by getting the loans from both the NGO and Government schemes.

Loan Repayment

Based on the regular repayment of the loan the respondents were categorized into two categories

and based on the source of loan repayment the women were classified into three categories as shown in Tables 3 and 4.

An overview of the Table 3 states that most (96.67%) of the SHG women were regularly repaying their loans and only 3.33 per cent of the respondents were found to be irregular in the loan repayment.

Higher proportion of the respondents in both the government (95.00%) and NGO (98.33%) were repaying the loans regularly, only meagre per cent of the women in government (5.00%), NGO (1.67%) SHGs were not regular in their loan repayment

It was observed from the Table 4 that 47.37 per cent of the women in government promoted SHGs were repaid the loan from the income they got from the investment of loan amount followed by the income from their employment (42.11%) and income from the both the loan investment and employment (10.53%), while in case of NGO promoted groups near to half of the respondents (49.15%) were repaid the loan amount through the income from the loan investment followed by the income from their employment(35.59%) and income from both the loan investment and regular employment (15.25%).

Table 2 Distribution of respondents according to their source of loan

(n=240)

S.No.	Source	Government(n=120)		NGO(n=120)		Total(n=240)	
		f	%	f	%	f	%
1	Yes	114	95.00	118	98.33	232	96.67
2	No	6	5.00	2	1.67	8	3.33
Total		120	100	120	100	240	100

Table 3 Distribution of respondents based on their repayment of loans

(n=240)

S.No.	Regular Repayment	Government(n=120)		NGO(n=120)		Total(n=240)	
		f	%	f	%	f	%
1	IRDP loan	13	10.83	0	0.00	13	5.42
2	NGO	0	0.00	2	1.67	2	0.83
3	IKP loan	107	89.17	20	16.67	127	52.92
4	Both 2&3	0	0.00	98	81.67	98	40.83
Total		120	100	120	100	240	100

Table 4. Distribution of respondents based on their source of loan repayment

		(n=232)					
S.No.	Regular Repayment	Government(n=120)		NGO(n=120)		Total(n=240)	
		f	%	f	%	f	%
1	Income from the employment	48	42.11	42	35.59	90	38.79
2	Income from the investment of loan amount	54	47.37	58	49.15	112	48.28
3	Loan from both the above sources	12	10.53	18	15.25	30	12.93
Total		114	100	118	100	232	100

On the whole majority (48.28%) of the respondents were repaying the loan through the income from their loan investment followed by the income from their employment (38.79%) and income from both the loan investment and from their regular employment (12.93%).

From the results it could be professed that majority of the respondents were repaying their loans regularly from the income they get through their loan investment. It might be due to increased awareness of group members that only through the regular repayment of the loan only then they could get the new loan as the bank officials and government were looking their past records of loans repayment on before sanctioning the new loan. It was also made clear that the majority were investing their loan amount into income generating activities.

Purpose of Loan Utilization

Under this the respondents were classified based on their purpose of loan utilization into 10 categories as depicted in table 5.

It was apparent from the Table 5 that little less than half (49.17%) of the respondents in the government promoted SHGs had utilized their loan for their children education followed by to start up a new business (32.50%), house construction (30.00%), to repay their old debts. (29.17%), allied agriculture purposes (28.33%), festivals/ functions (26.67%), medical treatment (23.33), to develop old business (20.83%), cultivation (16.67%) and to improve their sanitary conditions (15.00%). 47.50 per cent of the respondents in the NGO promoted SHGs had utilized their loan for repaying the old debts followed by cultivation (45.00%), to start up the business (41.67%),

Table 5. Distribution of respondents based on their purpose of loan utilization

		(n=240)					
S.No.	Purpose of utilization	Government(n=120)		NGO(n=120)		Total(n=240)	
		f	%	f	%	f	%
1	Cultivation	20	16.67	54	45.00	74	30.83
2	Allied agriculture	34	28.33	29	24.17	63	26.25
3	To repay old debts	35	29.17	57	47.50	92	38.33
4	To start a new business	39	32.50	50	41.67	89	37.08
5	To develop old business	25	20.83	42	35.00	67	27.92
6	Festival/ functions	32	26.67	20	16.67	52	21.67
7	Children education	59	49.17	45	37.50	104	43.33
8	Medical treatment	28	23.33	23	19.17	51	21.25
9	House construction	36	30.00	46	38.33	82	34.17
10	To improve sanitary conditions/ home needs	18	15.00	9	7.50	27	11.25

* Multiple responses

house constructions (38.33%), children education (37.50%), to develop new business (35.00%), allied agriculture (24.17%), medical treatment (19.17%), festivals/functions (16.67%) and only 7.50 per cent of the respondents had utilized their loan to improve their sanitary conditions/ home needs.

On the whole majority (43.33%) of the respondents had utilized their loan for the children education followed by to repay their old debts. (38.33%), to start up a new business (37.08%), house construction (34.17%), cultivation (30.83%), to develop old business (27.92%), allied agriculture purposes (26.25%), almost equal proportion of the respondents had utilized loan for festivals/functions (21.67%), medical treatment (21.25%), and to improve their sanitary conditions home needs (11.25%).

Perusal of the results clearly indicated that majority of the women were utilizing their loan borrowed for children education, as they might have realized the importance of education and proceeded to accomplish it than other necessities. Starting up the new enterprises, repayment of the old debts and construction of house were the next more utilized purposes by the women. This might be because these were the other purposes through which they can improve their family conditions and even the rate of interest was high hence they have utilized their loan amounts to reduce the burden on them and remaining amount for the house construction to fulfil their basic needs.

These results of the current study found to be similar to the findings of Bhagyasree (2014).

CONCLUSION

Majority of the SHG women had received less number of loans (55.83%) followed by average number of loans (35.00%), from IKP (52.92%) and were repaying loans regularly (96.67%) through the income gained from the loan investment (48.28%), loans were mostly utilized for their children education, to clear old debts and to start up a new business. There is urgent need to streamline the procedure for applying, seeking and releasing of credit from the banks.

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FARMER'S OPINION TOWARDS Bt COTTON CULTIVATION

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ABSTRACT

The present study was carried out in Rajsamand district of Rajasthan. Total 120 cotton growers were selected from eight villages of Railmangra tehsil of Rajsamand district. The findings of study revealed that 66.67 per cent of the total respondents possessed medium level of opinion about cultivation of Bt cotton. It was further observed that majority of respondents were interested to grow this crop continue due to its fibre value and get more money after selling its produce in market. It was further noted that these was a significant difference among the marginal, small and large farmers with respect to opinion of Bt cotton cultivation practices.

INTRODUCTION

India ranks first in area and third in cotton production in the world although the productivity is low. The major reason for low productivity is damage caused to plants by boll worms complex. In India around Rs. 1100 crores worth of chemical pesticides are used only for the control of boll worms. The indiscriminate use of insecticides like synthetic among key pests especially *Helicoverpa armigera* which ultimately leads to crop failure in most parts of India, resulting in increasing trend of cotton farmers committing suicides by consuming insecticide every year. Finally in march 2002, the Indian Government permitted commercial cultivation of genetically modified Bt cotton. Thereafter, in Rajasthan Bt cotton is mainly grown in Bhilwara, Chittorgarh, Rajsamand, Banswara, Shri Ganganagar, Bikaner, Nagaur, Rajsamand is major Bt cotton growing district of the state and it is grown in 6529 hectares area with production of 10400 metric tonnes in this district. The climatic conditions of the district is also most suitable for its cultivation. Keeping these facts in view the present study was undertaken with the following specific objectives :

1. To know the opinion of farmers towards Bt cotton cultivation technology.
2. To compare the opinion among marginal, small and large farmers regarding cultivation of Bt cotton.

RESEARCH METHODOLOGY

The present study was conducted in the purposely selected Rajsamand district of Rajasthan. There are total seven tehsils in Rajsamand district, out of which, one tehsil namely Railmagra was selected on the basis of maximum area under cultivation of Bt cotton. Further, a comprehensive list of all the major Bt cotton growing villages was prepared in consultation with the personnel of revenue and Agriculture Department from the identified tehsil. Eight villages from selected tehsil were taken on the basis of maximum area under Bt cotton cultivation for the present investigation. For selection of respondents, a comprehensive list of Bt cotton growers was prepared with the help of village. Patwari and agriculture supervisor of respective villages.

The list so prepared, 5 marginal, 5 small and 5 large growers were selected randomly from each identified village. Thus, in all 120 farmers (40 marginal, 40 small and 40 large farmers) were included in the sample of the study. Thereafter data were collected from the selected respondents and these data were analysed, tabulated and interpreted the results in the light of the objectives of the study.

RESULTS AND DISCUSSION

To know the opinion of farmers towards Bt cotton cultivation technology, 19 statements were developed. The responses were recorded on five

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point continuum and respondents were categorized into three groups on the basis of opinion score obtained viz., most favourable, moderately favourable and least favourable. These categories were formulated on the basis of calculated mean and standard deviation (S.D.) The results have been presented in Table 1.

Data presented in Table 1 visualize that 66.67 per cent of the total respondents were from moderately favourable opinion group, followed by 20.83 per cent respondents were from most favourable opinion and 12.50 per cent respondents were from least favourable opinion about cultivation of Bt cotton.

A close observation of data makes it clear that 25.00 percent of large farmers, 20.00 per cent small farmers and 17.50 per cent marginal farmers possessed most favourable opinion towards Bt cotton cultivation technology. While, majority of respondents i.e. 75.00 per cent large farmers, 65.00 per cent small farmers and 60.00 per cent marginal farmers be found in moderately opinion group. Further analysis of table shows that 22.50 per cent marginal farmers, 15.00 per cent small farmers and none of the large farmers had least favourable opinion towards improved Bt cotton cultivation technology.

From the above discussion, it could be concluded that majority of Bt cotton growers had positive opinion about Bt cotton cultivation technology. It was concluded that all the large farmers possessed either moderate or most favourable opinion towards improved Bt cotton cultivation technology. The results of the study are in line with the finding of Meena (2003) who reported that majority of respondents (68.34%) had their attitude in positive direction towards cultivation of safed musli. The

results of the study are also in line with the findings of Yadav (1988) who reported that majority of the farmers had their attitude in positive direction towards training and visit system.

For knowing the opinion of Bt cotton growers towards the different aspects of improved Bt cotton cultivation technology, in all 19 statements were considered. Mean percent score for each statement was calculated and ranked accordingly. The results are presented in Table 2.

Data accorded in Table 2 reveal that most of the Bt cotton growers were strongly agreed with the fact that "Bt cotton is a valuable cash crop of textile industries" with MPS 91.87 and was ranked first by the cotton growers. This was followed by the statements like "the soil and climatic condition is more suitable for its cultivation" and "water requirement is more for its cultivation than other fibre/cereal crops", which were also highly viewed by the farmers with MPS 80.20 and 70.62, respectively.

Table further shows that respondents had strongly disopined with the statement entitled "well organized marketing channels are available in our area for its selling of produce." which was ranked fourth with MPS 63.96. Whereas, the statement namely "natural calamities are the important barriers for cultivation of Bt cotton" was positively viewed by the respondents with MPS 62.29 and assigned rank fifth in the ranking order of opinion statements.

Further analysis of Table clearly shows that Bt cotton growers also agreed with the positive statements namely "lack of proper training is constraint in its cultivation", "mal practices in the market pushed us back for cultivation of Bt cotton," "the harvesting practices of Bt cotton is more

Table 1. Distribution of respondents on the basis of their level of opinion towards cultivation of Bt cotton

S.No.	Opinion group	Marginal farmers		Small farmers		Large farmers		Total	
		f	%	f	%	f	%	f	%
1.	Most favourable	7	17.50	8	20.00	10	25.00	25	20.83
2.	Moderately favourable	24	60.00	26	65.00	30	75.00	80	66.67
3.	Least favourable	9	22.50	6	15.00	0	00.00	15	12.50
Total		40	100.00	40	100.00	40	100.00	120	100.00

f-frequency, %-per cent

Table 2. Opinion of the farmers towards different aspects of Bt cotton cultivation technology

No.	Opinion statements	Marginal farmers		Small farmers		Large farmers		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1.	Bt cotton is a valuable cash crop of textile industries	92.50	1	93.12	1	90.00	2	91.87	1
2.	The cultivation of Bt cotton is less advantageous than other fibre crops	34.17	18	33.75	14	34.37	17	34.17	16
3.	Bt cotton is more input intensive crop	52.50	10	27.50	18	66.87	5	48.95	11
4.	Bt cotton is less labour intensive than other fibre crops	35.00	17	25.00	19	36.25	16	32.08	17
5.	The soil and climatic condition is more suitable for its cultivation	59.37	5	88.75	2	92.50	1	80.20	2
6.	Proper guidance from the extension agencies is timely available for its cultivation	46.87	13	43.13	11	50.00	12	46.66	12
7.	Non-availability of timely credit facility repels us from the cultivation of this crop	53.75	9	51.25	10	56.87	9	53.59	9
8.	The recommended cultivation of Bt cotton is more complex in nature	48.13	12	29.37	17	38.13	14	38.54	14
9.	The cultivation of Bt cotton is required more plant protection measures	51.25	11	53.12	9	53.12	11	52.49	10
10.	The agriculture supervisor working in our area is competent enough to educate about its scientific cultivation	38.75	14	37.50	13	42.50	13	39.58	13
11.	Water requirement is more for its cultivation than other fibres/cereals	68.25	2	70.75	3	73.04	3	70.62	3
12.	Well organized marketing channels are available in our area for its selling for produce	58.75	6	63.76	4	69.38	4	63.96	4
13.	Mal practices in the market pushed us back for cultivation of Bt cotton	60.00	4	58.75	7	53.75	10	57.50	7
14.	The cost of cultivation of this crop is very high	36.25	15	37.59	12	36.87	15	36.87	15
15.	Natural calamities are the important barriers for cultivation of Bt cotton crop	63.75	3	63.12	6	60.00	8	62.29	5
16.	The harvesting practices of Bt cotton is more expensive than other crops	55.00	8	55.69	8	61.87	7	57.29	8
17.	The yield of Bt cotton is high than normal cotton crop	31.25	19	30.10	16	30.07	19	30.41	18
18.	The Bt cotton crop is more susceptible to the boll worms	36.25	16	31.25	15	31.73	18	30.00	19
19.	Lack of Proper training is constraint in its cultivation	55.63	7	63.75	5	65.00	6	61.46	6

MPS = Mean per cent score

expensive than other crops”, “non-availability of timely credit facility repels us from the cultivation of this crop” and “the cultivation of Bt cotton is required more plant protection measures” with MPS 61.46, 57.50, 57.29, 53.59 and 52.49 respectively. These statements were placed on sixth, seventh, eighth, ninth and tenth position in ranking hierarchy by the respondents respectively.

It was further observed that most of the respondents were disagreed with negative statements like “proper guidance from the extension agencies is timely available for its cultivation”, “the agriculture supervisor working in our area is competent enough of educate about its scientific cultivation,” which were ranked twelfth and thirteen respectively. The mean per cent score of these statements was 46.66 and 39.58 respectively. The statement was considered as least favourable by the Bt cotton growers was

“the Bt cotton crop is more susceptible to the boll worms” with MPS 30.00 . This statement was expressed at the lowest in the opinion hierarchy by the cotton growers because Bt cotton is resistant to attack of boll worms.

Thus, from the above results, it may be concluded that respondents showed the favourable opinion towards the cultivation of Bt cotton. Majority of respondents were interested to grow this crop continue due to its fibre value and get more money after selling its produce in market. The present findings are conformity with the findings of Meena (2003).

Analysis of variance test was applied to see the significant difference in level of opinion possessed by the different categories of respondents. The result of ANOVA computed for this purpose has been presented in table 3.

Hypotheses

NH_0 : There is no significant difference among marginal, small and large farmers regarding opinion towards cultivation of Bt cotton.

RH : There is significant difference among marginal, small and large farmers regarding opinion towards cultivation of Bt cotton.

Table 3. Comparison in the opinion of the different categories of farmers about Bt cotton cultivation

Source of variation	d.f.	SS	MSS	F Value
Between the categories of farmers	2	451.617	225.80	16.34**
Error	117	1616.38	13.81	
Total		119	2067.997	

** Significant at 1% level of significance

Mean Value Table

No.	Categories of farmers	Mean value	C.D.	C.V.
1.	Marginal farmers	39.32		
2.	Small farmers	40.95	0.627	19.51
3.	Large farmers	41.90		

The data presented in Table 3 clearly show that the calculated F value 16.34, which was higher than tabulated value at 1 per cent level of significant, so that null hypothesis is rejected and alternate hypothesis entitled “there is significant difference among marginal, small and large farmers regarding opinion towards cultivation of Bt cotton” was accepted. Thus, it is inferred that there was a significant difference in the level of opinion of farmers towards Bt cotton cultivation in the study area.

Further analysis of Table 3 reveals that by comparing the mean value with critical difference (C.D.) value, it was found that there was a significant difference between large and small farmers, small and marginal and large and marginal farmers about opinion of improved Bt cotton cultivation technology. The mean value further shows that large farmers possessed more favourable opinion than small and marginal farmers about Bt cotton cultivation technology.

These findings are in line with findings of Kumari (2006) who concluded that there was significant difference between periphery and distant respondents in opinion towards garlic cultivation technology. It was further inferred that peripheral respondents had more positive opinion than distant respondents with respect to cultivation of garlic in

Chittorgarh district of Rajasthan.

CONCLUSION

From the above results it can be concluded that 66.67 per cent of total respondents had moderately favourable opinion towards Bt cotton technology, while 20.83 and 12.50 per cent Bt cotton growers had most favourable and least favourable. There was a significant difference among the marginal, small and large farmers with respect to opinion of Bt cotton cultivation practices.

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COST OF CULTIVATION OF CLUSTER BEAN IN BHILWARA DISTRICT OF RAJASTHAN

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ABSTRACT

Cluster bean or guar is a drought tolerant, multi-purpose legume crop cultivated mainly in the Kharif season in arid environments and is used as animal feed, fodder, green manure and for extraction of gum for industrial uses. India, being largest cluster bean producer, contributes 75-80 per cent to the global cluster bean basket. Rajasthan is major player by contributing 72 per cent of total production. The expansion of uses of cluster bean to new areas has transformed cluster bean in recent years into an important export crop. The increased demand has resulted in a strong escalation of the prices of cluster bean. Looking at the agricultural and industrial importance of this marginalized crop in Rajasthan, particularly realizing the potential in southern parts of the state, the present study attempted to analyse the present scenario of the production of cluster bean crop in southern parts of the state. Returns per rupee invested on cluster bean crop were Rs. 2.09, Rs. 2.13 and Rs. 2.68 for small, medium and large farms, respectively with overall Rs. 2.28 in Bhilwara district. The cluster bean cultivation was more profitable enterprise in case of large farmers as compared to small and medium farmers.

INTRODUCTION

Cluster bean (*Cyamopsis tetragonoloba* L.) commonly known as Guar, is a drought and high temperature tolerant deep rooted summer annual legume of high social and economic significance. The crop is mainly grown in the dry habitats of Rajasthan, Haryana, Gujarat and Punjab and to limited extent in Uttar Pradesh and Madhya Pradesh. India contributes 75 - 80 per cent to the global cluster bean basket followed by Pakistan, Sudan and USA. Rajasthan is major cluster bean producing state of the country by contributing around 72 per cent of its production. In India, Cluster bean crop is cultivated mainly during kharif season, with an annual production of around 2 million metric tonnes. Cluster bean is sown in the months of July and August after the first shower of the monsoon and it is harvested in the months of October and November.

The area, production and yield of the crop are inconsistent due to its over dependence on weather and production confined to limited geographical area largely arid regions. Cluster bean yields vary on rainfall and weather conditions, making production

forecasting extremely difficult compared to other field crops. The expansion of uses of cluster bean to new areas like extraction of natural and shale gas has transformed cluster bean in recent years into an important export crop. The increased demand has resulted in a strong escalation of the prices of guar beans and its products during recent past. The stocks maintained at different level in the supply chain play a vital role in total availability of the crop for processing and export. Nevertheless, the prices of cluster bean have shown uncertainty and high volatility.

The crucial economic parameters related to the production of cluster bean include cost, return and profitability. While cost and returns depend on physical quantities of output and inputs as well as its prices, the profit is the residual of cost over return. Cost effectiveness is the primary requirement for competitiveness of any production activity. Similarly profitability is also the prime motto behind the sustainability of any activity. Therefore if cluster bean production is cost effective and profitable in new areas then farmers can survive in the demand driven and market oriented regime.

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RESEARCH METHODOLOGY

The primary data were collected for the year 2013-14. Bhilwara district was purposively selected for the present study. Ashind tehsil in Bhilwara district was selected on the basis of highest acreage under the cluster bean cultivation among all tehsils of the Bhilwara districts. Two villages i.e. Pratap pura and Antali in Ashind tehsil of Bhilwara district was finally selected. A sample of 20 farmers in each village was selected randomly.

Cost structure of cluster bean on different size of holdings was examined. The cost of cultivation of cluster bean was worked out by using various cost concepts as defined below.

Cost A₁:

- (1) Value of hired human labour (Rs.)
- (2) Value of owned and hired animal labour (Rs.)
- (3) Value of owned and hired machine labour (Rs.)
- (4) Value of seed (both farm produced and purchased) (Rs.)
- (5) Value of manure (owned and purchased) (Rs.)
- (6) Value of fertilizers, insecticides and pesticides (Rs.)
- (7) Irrigation charges (Rs.)
- (8) Depreciation on implements and farm buildings (Rs.)
- (9) Land revenue, cesses and other taxes (Rs.)
- (10) Interest on working capital (Rs.)
- (11) Miscellaneous expenses (artisans, etc.) (Rs.)

Cost A₂: Cost A₁ + rent paid for leased-in land (Rs.)

Cost B₁: Cost A₁ + interest on value of owned fixed capital assets (excluding land) (Rs.)

Cost B₂: Cost B₁ + rental value of owned land (net of land revenue) and rent paid for leased-in land (Rs.)

Cost C₁: Cost B₁ + imputed value of family labour (Rs.)

Cost C₂: Cost B₂ + imputed value of family labour (Rs.)

Cost C₃: Cost C₂ + 10 per cent of Cost C₂ to account for managerial input of the farmer (Rs.)

Cost of production

The cost of production was worked out using following formula:

$$\text{Cost of production / q} = \frac{\text{Cost of cultivation / ha}}{\text{Quantity of main product / ha}}$$

The cost per quintal was worked out by subtracting the value of by- product from the total cost and then dividing the remaining amount by the number of quintals of grains produced.

Income measures:

Following income measures were calculated:-

$$\text{Gross income (GI)} = Q_m \times P_m + Q_b \times P_b$$

Where, GI = Gross income

$$Q_m = \text{Quantity of main product}$$

$$P_m = \text{Price of main product}$$

$$Q_b = \text{Quantity of by- product}$$

$$P_b = \text{Price of by- product}$$

Net Income:

$$\text{Gross income} - \text{Total expenses (Cost } C_2)$$

Returns per rupee investment (RPR) or Cost Return Ratio (CRR)

$$\text{RPR} = \frac{\text{Gross income / ha}}{\text{Cost } C_2 / \text{ha (Total cost)}}$$

RESULTS AND DISCUSSION

Using different cost concepts, it is possible to find out different types of income measures. These include farm business income, which indicates returns over variable cost. The family labour income, which is residual of gross income over cost B₂, explains the returns to family labour and has lot of relevance under Indian conditions.

Cost and return for small farmers

Different cost components along with return are depicted in Table 1 for small farmers in Bhilwara district. On an average, the total cost of cultivation

Table 1. Cost of cultivation for cluster bean in Bhilwara district

Particulars	(Rs./ Ha)							
	Small Farmers		Medium Farmers		Large Farmers		Overall	
Ploughing	4400.00	(20.50)	4272.08	(21.63)	3694.00	(20.88)	4122.03	(21.00)
Harrowing	371.43	(1.73)	1322.95	(6.70)	1195.58	(6.76)	963.32	(4.91)
Planking	194.29	(0.91)	607.57	(3.08)	448.50	(2.54)	416.78	(2.12)
Sowing Cost	5042.00	(23.49)	2930.38	(14.84)	2593.38	(14.66)	3521.92	(17.94)
Weeding	132.57	(0.62)	123.39	(0.62)	187.81	(1.06)	147.92	(0.75)
Plant Protection	116.57	(0.54)	109.15	(0.55)	123.02	(0.70)	116.25	(0.59)
Irrigation	646.00	(3.01)	498.57	(2.52)	427.23	(2.42)	523.93	(2.67)
Fertilizer	203.89	(0.95)	365.20	(1.85)	365.23	(2.06)	311.44	(1.59)
Harvesting	221.71	(1.03)	138.57	(0.70)	210.17	(1.19)	190.15	(0.97)
Threshing	2095.41	(9.76)	1818.48	(9.21)	1593.77	(9.01)	1835.89	(9.35)
Miscellaneous	600.00	(2.80)	600.00	(3.04)	600.00	(3.39)	600.00	(3.06)
Interest on working capital	701.19	(3.21)	639.32	(3.24)	571.93	(3.23)	637.48	(3.25)
Rent paid on leased in land	200.00	(0.93)	200.00	(1.01)	200.00	(1.13)	200.00	(1.02)
Total operational cost	14925.07	(69.55)	13625.66	(68.99)	12210.60	(69.03)	13587.11	(69.20)
Interest on fixed capital asset	1472.00	(6.86)	1472.00	(7.45)	1472.00	(8.32)	1472.00	(7.50)
Rental value	2912.00	(13.57)	2912.00	(14.74)	2912.00	(16.46)	2912.00	(14.83)
Depreciation	217.00	(1.01)	217.00	(1.10)	217.00	(1.23)	217.00	(1.11)
Family labour	1934.74	(9.02)	1523.24	(7.71)	877.80	(4.96)	1445.26	(7.36)
Total fixed cost	6535.74	(30.45)	6124.24	(31.01)	5478.80	(30.97)	6046.26	(30.80)
Total cost	21460.81	(100.00)	19749.90	(100.00)	17689.40	(100.00)	19633.37	(100.00)

Figures in parentheses are percentages to total cost C_2

was Rs. 21460.80, out of which the variable cost shared Rs. 16859.80 (78.57%) and the fixed cost shared Rs. 4601.00 (21.43%). The gross return per hectare was Rs. 45028.57 with net return of Rs. 23567.77. Share of main product and by product was 80.52 and 19.48 per cent, respectively. Return per rupee invested on cluster bean was Rs. 2.10.

Structure of cost of cultivation

The comparative estimates of different costs incurred in cluster bean cultivation in Bhilwara district for different size groups are given in Table 2. Due to less extent of leased in/ leased out tendency cost A_1 i.e. Rs. 13604.11 (69.29%) and cost A_2 i.e. Rs. 13804.11

(70.31%) differed slightly on overall basis. The cost A_1 and A_2 decreased with increase in size of holding. On overall basis, cost B_1 and B_2 were worked out to be Rs. 15076.11 and Rs. 18188.11, per hectare respectively. The cost C_1 and C_2 were higher on small farms followed by medium and large farms mainly because of higher use of family labour on small farms. On an average, the cost C_1 accounted to Rs. 16521.37 (84.15%) and C_2 as Rs. 19633.37 per hectare.

Return over cost of cluster bean cultivation in Bhilwara district

A comparison of return over cost for cluster bean cultivation and production on different categories

Table 2. Different cost concepts for cost of cultivation of cluster bean in Bhilwara district

(Rs. / Ha)				
Cost	Small Farmers	Medium Farmers	Large Farmers	Over All
Cost A ₁	14,942.07 (69.62)	13,642.66 (69.08)	12,227.60 (69.12)	13,604.11 (69.29)
Cost A₂	15,142.07 (70.56)	13,842.66 (70.09)	12,427.60 (70.25)	13,804.11 (70.31)
Cost B ₁	16,414.07 (76.48)	15,114.66 (76.53)	13,699.60 (77.45)	15,076.11 (76.79)
Cost B ₂	19,526.07 (90.98)	18,226.66 (92.29)	16,811.60 (95.04)	18,188.11 (92.64)
Cost C ₁	18,348.81 (85.50)	16,637.90 (84.24)	14,577.40 (82.41)	16,521.37 (84.15)
Cost C₂	21,460.81 (100.00)	19,749.90 (100.00)	17,689.40 (100.00)	19,633.37 (100.00)
Cost C ₃	23,606.89 (110.00)	21,724.89 (110.00)	19,458.34 (110.00)	21,596.71 (110.00)

Figures in parentheses are percentages to total cost C₂

Table 3. Return over cost of cluster bean in Bhilwara district

Category	Cost of Cultivation (Rs. / Ha)		Gross Return (Rs. / Ha)	Returns over (Rs. / Ha)		Cost of Production (Rs. / Qt)	
	Paid out Cost	Total Cost		Total Cost	Paid out Cost	Paid out Cost	Total Cost
Small	15,142.07 (70.56)	21,460.81 (100.00)	45,028.57 [2.09]	23,567.76	29,886.51	1,879.33 (70.56)	2,663.58 (100.00)
Medium	13,842.66 (70.09)	19,749.90 (100.00)	42,109.52 [2.13]	22,359.63	28,266.86	1,844.52 (70.09)	2,631.65 (100.00)
Large	12,427.60 (70.25)	17,689.40 (100.00)	47,416.67 [2.68]	29,727.27	34,989.07	1,467.83 (70.25)	2,089.30 (100.00)
Over All	13,804.11 (70.31)	19,633.37 (100.00)	44,851.59 [2.28]	25,218.22	31,047.48	1,723.46 (70.31)	2,451.25 (100.00)

Figures in parentheses are percentages to total cost C₂, Figures in brackets are return on one rupee invested

farmers in Bhilwara district is depicted in Table 3. Returns over total cost were quite high for large farmers (Rs. 29727.27 per hectare) than small (Rs. 23567.76 per hectare) and medium (Rs. 22359.63 per hectare) farmers which showed that profitability increases with the increase in size of land holding. Return per rupee invested on cluster bean crop was Rs. 2.09, Rs. 2.13 and Rs. 2.68 for small, medium and large farms, respectively with overall of Rs. 2.28 in Bhilwara district.

CONCLUSION

Thus, it can be concluded that due to economies of scale per unit output of cluster bean for large farmers was maximum followed by medium farmers and small farmers The profitability per hectare was less on small and marginal farmers due to more cost on machine

labour, seed, fertilizer and other inputs. Although, the profitability measured in net income was quite high due to less input requirement as overall share on planking, irrigation, fertilizers, weeding, plant protection measures, harvesting, rent paid for leased in land, depreciation cost etc. were quite low over total cost.

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KNOWLEDGE AND ADOPTION OF IMPROVED POST HARVEST TECHNOLOGIES OF MAIZE BY FARMERS OF AGRO-CLIMATIC ZONE IV A OF RAJASTHAN

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ABSTRACT

The present study was undertaken to assess and compare the knowledge of improved post harvest technologies of maize by the farmer. The study was conducted in two purposively selected districts viz. Udaipur and Chittorgarh of Agro climatic zone IV A of Rajasthan. Two panchayat samities from each district were selected purposively and three villages from each panchayat samiti were selected on random basis. Thus, there were total six villages from each district and total 12 villages from both the districts. Fifteen farmers from each village were selected. Thus, total sample for the present study was 180 respondents. The farmers possessed good knowledge and medium level of adoption about improved post harvest technologies of maize with overall MPS 68.25 and 59.44, respectively.

INTRODUCTION

Research and Extension are two important pillars of agriculture development. During the post independence period, considerable research efforts have been made in the country resulting in appreciable increase in agriculture production. The intensive efforts of research scientists have resulted into development of improved varieties of maize crop which have much higher production potential as compared to the local one. Similarly, the extension scientists of KVKs and field functionaries under Broad Based Agriculture Extension System are actively engaged in dissemination of technologies among the farming community. Despite active involvement of research and extension scientists, the expected results in crop productivity could not be achieved and there exists a vast gap in productivity between the highest yield recorded at the farmer's field and those representing the mean performance in the state. Apart from this, there is a considerable loss of food grains during various post harvest operations. This is basically due to lack of knowledge and non-adoption of improved technologies by the farming community (Intodia and Mathur, 2000-2002). Hence, it is imperative to know whether the farm families are aware of improved post harvest technologies or not, to what extent they have adopted the improved technologies recommended by

scientists. Therefore, the present study has been undertaken with the objective to assess the knowledge and adoption of improved post harvest technologies of maize among farmers of Agro-climatic zone IV A of Rajasthan.

RESEARCH METHODOLOGY

The present study was conducted in the Agro-climatic zone IV A i.e. Sub-humid Southern Plain and Aravali Hills of Rajasthan State. Zone IV A covers all the tehsils of Bhilwara and Rajsamand districts, all tehsils of Udaipur district except Dhariyawad, Salumber and Sarada, all tehsils of Chittorgarh district and Aburoad and Pindwara tehsils of Sirohi district. Out of these, two districts namely Udaipur and Chittorgarh were selected purposively on the basis of highest production of maize. Zone IV- A of Rajasthan covers fourteen panchayat samities of Udaipur and eleven of Chittorgarh district. Out of these, two panchayat samities from each district were selected purposively on the basis of highest production of maize. Thus, from Udaipur district, *Mavli* and *Girwa* panchayat samities and from Chittorgarh district, *Begu* and *Chittorgarh* panchayat samities were selected. In each district, panchayat samiti wise list of villages was prepared and from the list three villages from each panchayat samiti were selected on random basis. Thus, there were six

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villages from each district making total 12 villages from both the districts. Random sampling technique was used to draw a sample of 180 farmers. Collected data were tabulated and analyzed by using mean, frequency, percentage and mean percent score.

RESULTS AND DISCUSSION

Knowledge of the farmer about improved post harvest technologies of maize

Knowledge of the respondents about improved post harvest technologies of maize was assessed under six components viz time of harvesting, storage structure, use of fumigants, use of rodenticides, storage pests and considerations in storage of grains.

Perusal of Table 1 depicts that farmers possessed good knowledge about improved post harvest technologies with overall MPS 68.25. Distribution of the farmers in various knowledge categories highlight that in component use of rodenticides, all the farmers belonged to good knowledge category. Similarly majority of the respondents belonged to good knowledge category in components time of harvesting (93.33%) and storage pests (86.67%). With regard to storage structures, 55.56 per cent respondents belonged to good knowledge category whereas, 44.44 per cent respondents were in the category of average knowledge. Likewise, in component use of fumigants and considerations in storage of grains, 53.33 and 60.00 per cent respondents were found in average knowledge

category.

The knowledge score of the farmers in different components highlights that they possessed good knowledge in component time of harvesting with MPS 93.33 followed by storage pests (MPS 86.67), use of rodenticides (MPS 75.56), considerations in storage of grains (MPS 69.33), use of fumigants (MPS 68.00) and storage structures (MPS 62.55).

In-depth knowledge assessment indicates that majority of the farmers were well acquainted with time of harvesting i.e. when leaves become yellowish, at the time of black layer formation and at 15-20 per cent moisture in grains. Farmers were also well acquainted with name of rodenticides and correct method of preparing poison bait for rat control.

Similarly, they possessed very good knowledge about considerations in storage of grain like grain should be dried properly, old and new grain should not be mixed, grain should be stored at room temperature and *kothi* should be cleaned before storage. Likewise, farmers knew about precautions in use of fumigants like storage structure should be air tight, fumes should not be inhaled while keeping fumigants, children and pet animals should be kept away from storage place etc. However, they were unaware about correct dose of fumigants. Farmers were well acquainted with different methods of treatment of storage structure and gunny bags, measures to protect mud bins from termite and place of storage structure.

Table 1 : Distribution of the farmers by their knowledge regarding improved post harvest technologies of maize

S.No.	Components	Knowledge categories						MPS
		Good		Average		Poor		
		f	%	f	%	f	%	
1	Time of harvesting	168	93.33	0	0.00	12	6.67	93.33
2	Storage structure	100	55.56	20	44.44	0	0.00	62.55
3	Use of fumigants	84	46.67	96	53.33	0	0.00	68.00
4	Use of rodenticides	180	100.00	0	0.00	0	0.00	75.56
5	Storage pests	156	86.67	0	0.00	24	13.33	86.67
6	Considerations in storage of grains	72	40.00	108	60.00	0	0.00	69.33
Overall		68	37.78	112	62.22	0	0.00	68.25

n=180

Table 2 : Distribution of the farmers by the adoption of improved post harvest technologies of maize

S.No.	Components	Adoption Categories						MPS
		High		Medium		Low		
		f	%	f	%	f	%	
1	Time of harvesting	180	100.0	0	0.00	0	0.00	100.0
2	Storage structure	24	13.33	96	53.33	60	33.3	45.00
3	Use of fumigants	48	26.67	0	0.00	132	73.3	26.67
4	Use of rodenticides	96	53.33	72	40.00	12	6.67	73.33
5	Considerations in storage of grains	75	41.67	104	57.78	1	0.56	63.89
Overall		72	40.00	107	59.44	1	0.56	59.44

Adoption of improved post harvest technologies of maize by the farmers

The extent of adoption of improved post harvest technologies of maize by the respondents was judged under three categories as high, medium and low adoption on the basis of MPS.

Perusal of Table 2 depicts that farmers had medium level of adoption of improved post harvest technologies of maize with overall MPS 59.44. This is further depicted by categorization of the respondents in adoption categories that majority of the respondents (59.44%) belonged to medium adoption category. Component wise adoption of post harvest technologies reveals that in component time of harvesting MPS was 100 which indicates that all of them harvested the crop at the right time and stage.

In case of storage structures, the adoption score was 45 per cent which indicates average adoption of the practice by the respondents. It is also depicted by categorization of the respondents in adoption categories that 53.33 per cent respondents belonged to medium adoption category whereas, 33.33 and 13.33 per cent respondents were found in low and high adoption category, respectively.

With regard to use of fumigants, it was found that MPS was only 26.67 indicating low adoption of the practice by the respondents. It is also depicted by the categorization of the respondents in adoption categories that majority of them (73.33%) belonged to low adoption category.

The respondents were following the practice of use of rodenticides for rat control with overall MPS 73.33. The respondents reported that they used zinc phosphide for rat control at home as well as farm. Anticoagulants viz. rodoferon and bromilidion were not used by any of the respondents due to lack of knowledge.

With regard to considerations in storage of grains, it was found that majority of the respondents (57.78%) belonged to medium adoption category with MPS 63.89. In discussion with the respondents they reported that during storage of food grains they use to follow certain precautions like did not mix old and new grains, store grains at room temperature and keep the storage structure air tight.

CONCLUSION

On the basis of findings it could be concluded that the farmer had good knowledge about improved post harvest technologies of maize however, the adoption was found to be medium.

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AN INTER-TEMPORAL ANALYSIS OF INFRASTRUCTURAL DEVELOPMENT IN RAJASTHAN

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ABSTRACT

The present study was conducted for three points of time i.e. year 1980-81, 1990-91 and 1996-97. The district was considered as the unit of analysis and twenty six districts as existed in the year 1980-81 were included in the study which covered the entire geographical area of the state. For measuring infrastructural development, 7 indicators were used to construct the composite indices of development for each district of Rajasthan. The values of mean composite index for the year 1980-81, 1990-91 and 1996-97 were obtained as 0.702, 0.790 and 0.782 respectively. The difference between the periods 1980-81 & 1990-91 and 1980-81 & 1996-97 was found significant whereas difference in infrastructural development between the year 1990-91 and 1996-97 was observed to be non-significant.

INTRODUCTION

Development implies an “improvement” in the material well being of the people in a region. Material well-being of a country or a region or a state can be identified with the increase in the real production, amenities, practice and adoption of new and modern technology and increased rate of investment and consumption. Any change for betterment in these parameters indicate development. Development in a country varies from place to place depending upon its geographical, ecological and climatic conditions. As a result, the level of development of different parts of the country may vary between the very high developed and extremely backward categories.

The state of Rajasthan is situated in the northwestern part of the Indian Union. It is the largest state with a geographical area of 3.42 lakh sq. kms. The shape of Rajasthan is like an irregular rhomboid, covering a distance of 869 kilometers from west to east and 826 kilometers from north to south. It shares its geographical boundaries with the states of Punjab, Haryana, Uttar Pradesh, Madhya Pradesh and Gujarat. It also has a long international border with Pakistan. It is a diverse state. The region to the west and north-west spreading in 61.11 per cent of the total area is either desert or semi-desert which forms the Great Indian ‘Thar’ desert. The Aravali range of Hills-one of the oldest mountain ranges-runs through the heart of the state, extending to 69.2 kms and dividing into two portions. The north-western portion

is almost entirely a vast expanse of desert. On the other side, the south-eastern region has a varied terrain of extensive hill ranges, fertile table-land and dense forest. Rajasthan is well connected by air, rail and road with all the major cities of the country.

The infra-structural facilities play a catalytic role in the process of development, hence great emphasis should be placed on infrastructural facilities like education, health, roads and communication in the programmes of economic development. Various schemes have been implemented under the successive five-year plans for the development of the infrastructure in the various districts of the Rajasthan state. However, all the districts of the state are not at the same level of development. Some districts are more developed while others are less developed or underdeveloped. Infrastructural development cannot be fully measured by any single indicator. Moreover, a number of indicators when analysed individually, do not provide an integrated and comprehensible picture of reality. Hence there is need for building up of a composite index of infrastructural development based on various indicators combined in an optimum manner.

Therefore the present study was conducted with the following specific objectives:

- (i) To construct the various indices of infrastructural development for each district of Rajasthan and classify the districts on the basis of their development.

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- (ii) To examine the significance of overall change in infrastructural development indices over three points of time.

RESEARCH METHODOLOGY

In order to assess the infrastructural development of Rajasthan state, the study was carried out for three points of time i.e. 1980-81, 1990-91 and 1996-97 with the purpose of examining the significance of change and variability in development. The study is based on the data gathered for 26 districts of Rajasthan as existed in the year 1980-81 in spite of separate information for 32 districts existing in 1997. The information of newly formed districts have been included in the original districts from which they have been bifurcated, since the data related to new districts were not available for all the three selected points of time.

To measure the infrastructural development, 7 indicators were identified after reviewing the literature as under:

- (i) Number of hospitals per lakh of population.
- (ii) Number of beds in hospitals per lakh of population.
- (iii) Number of high/senior secondary schools per 1000 school going children.
- (iv) Number of post offices per lakh of population.
- (v) Number of civil veterinary hospitals.
- (vi) Number of civil veterinary dispensaries.
- (vii) Road length per 100 square km. of geographical area (in km.).

The composite indices for various districts for infrastructural development were obtained through the formula suggested by Narain *et al.* (1991). The value of composite index is non-negative and it lies between 0 and 1. The value of index closer to zero indicates the higher level of development while the value of index closer to 1 indicates the lower level of development. In order to examine the significance of overall change in infrastructural development indices over three selected points of time, slippage test proposed by Rai (1987) was utilized.

RESULTS AND DISCUSSION

I Construction of composite indices of socio-economic development for each district of Rajasthan

This section describes the construction of indices of infrastructural development for each district of Rajasthan. To construct composite indices of development, variables were standardised. The best district for each indicator (with maximum/ minimum standardised value depending upon the direction of the indicator) was identified and the deviations of different indicators from their best value were obtained for each district. The districts were ranked on the basis of infrastructural development indices.

Perusal of Table 1 reveals that out of 26 districts included in the analysis for the year 1980-81, the district Jaisalmer ranked first followed by Ajmer, Udaipur, Bhilwara and Sikar districts. The districts Barmer, Nagaur, Tonk, Jhalawar and Jalore ranked last in infrastructural development. The mean index of development in this sector was 0.702 with CV 6.791 per cent. The composite indices of development varied from 0.537 to 0.799.

The table further reveals that the composite indices of development for the period 1990-91 varied from 0.567 to 0.977 with mean index value 0.790 and CV 13.536 per cent. A close observation of the table depicts that district Udaipur ranked first followed by Ajmer, Jhunjhunu, Sirohi and Dungarpur. The district namely Ganganagar, Barmer, Bhilwara, Jalore got the last ranks with Jhalawar at the bottom in ranking on the basis of infrastructural development. Comparative study of the time periods reveals that some of the districts have shown major changes in their ranking over the decade. District Banswara, Dungarpur, Nagaur, Pali, Sirohi and Tonk have influenced their ranking while districts like Bhilwara, Bikaner, Bundi and Jaisalmer have declined in their ranking this year.

The perusal of the Table 1 shows that district Udaipur again ranked first in infrastructural development during this period of study followed by Bhilwara, Ajmer, Jaipur and Jhunjhunu. The districts viz., Ganganagar, Sawai Madhopur, Jhalawar, Bundi and Jalore obtained the lowest ranks on the

basis of their infrastructural development. Major downward movement in the ranking of district Banswara and Sirohi was observed while Bhilwara district had moved to second place in the ranking this year. The value of composite indices varied from 0.579 to 0.989 with mean index of infrastructural

development as 0.782 and CV 14.073 per cent.

II. Significance of overall change in infrastructural development indices over three points of time

Having obtained the measure of infrastructural development (composite index) for each district over

Table 1. Composite indices of infrastructural development of each district for three points of time

District	1980-81		1990-91		1996-97	
	CI	Rank	CI	Rank	CI	Rank
1. Ajmer	0.634	2	0.580	2	0.601	3
2. Alwar	0.730	19	0.803	16	0.801	16
3. Banswara	0.732	21	0.737	8	0.843	19
4. Barmer	0.733	22	0.924	23	0.885	21
5. Bharatpur	0.726	18	0.753	11	0.774	12
6. Bhilwara	0.661	4	0.951	24	0.600	2
7. Bikaner	0.681	7	0.854	18	0.798	15
8. Bundi	0.680	6	0.851	17	0.954	25
9. Chittorgarh	0.708	12	0.739	9	0.768	11
10. Churu	0.721	17	0.856	19	0.816	17
11. Dungarpur	0.711	13	0.717	5	0.759	10
12. Ganganagar	0.731	20	0.877	22	0.867	22
13. Jaipur	0.685	8	0.719	6	0.648	4
14. Jaisalmer	0.537	1	0.778	13	0.785	13
15. Jalore	0.799	26	0.976	25	0.989	26
16. Jhalawar	0.742	25	0.977	26	0.944	24
17. Jhunjhunu	0.695	9	0.654	3	0.658	5
18. Jodhpur	0.696	10	0.756	12	0.756	9
19. Kota	0.715	15	0.862	21	0.818	18
20. Nagaur	0.734	23	0.781	14	0.750	8
21. Pali	0.717	16	0.724	7	0.666	6
22. Sawai Madhopur	0.713	14	0.861	20	0.903	23
23. Sikar	0.677	5	0.752	10	0.723	7
24. Sirohi	0.702	11	0.715	4	0.790	14
25. Tonk	0.739	24	0.787	15	0.852	20
26. Udaipur	0.648	3	0.567	1	0.579	1
Mean	0.702	0.790	0.782			
S.D.	0.048	0.107	0.110			
CV	6.791m	13.536	14.073			

CI = Composite index

different points of time, attempt was made to examine the significance of change in development indices over time. The perusal of Table 2 depicts the composite indices of infrastructural development of each district and their ranking over three points of time. The rankings over different points of time has been examined and the value of test statistic M was worked out to be 16.75 which comes out to be significant at 1 per cent level of significance. This indicates the rejection of null hypothesis of no change in development in districts over time. From

this, it can be concluded that the level of infrastructural development is significantly different over three points of time. Since the null hypothesis was rejected, multiple comparisons to determine the significance of difference in infrastructural development over individual pairs of time periods i.e. t_1 and t_2 , t_1 and t_3 , and t_2 and t_3 were made. Following differences of sums of ranks were obtained:

$$|R_{t1} - R_{t2}| = 26.5$$

Table 2. Ranking of composite indices of infrastructural development of each district over three points of time

Districts	1980-81		1990-91		1996-97	
	Composite index	Rank	Composite index	Rank	Composite index	Rank
Ajmer	0.634	3	0.580	1	0.601	2
Alwar	0.730	1	0.803	3	0.801	2
Banswara	0.732	1	0.737	2	0.843	3
Barmer	0.733	1	0.924	3	0.885	2
Bharatpur	0.726	1	0.735	2	0.744	3
Bhilwara	0.661	2	0.951	3	0.600	1
Bikaner	0.681	1	0.854	3	0.798	2
Bundi	0.680	1	0.851	2	0.954	3
Chittorgarh	0.708	1	0.739	2	0.768	3
Churu	0.721	1	0.856	3	0.816	2
Dungarpur	0.711	1	0.717	2	0.759	3
Ganganagar	0.731	1	0.877	3	0.867	2
Jaipur	0.685	2	0.719	3	0.648	1
Jaisalmer	0.537	1	0.778	2	0.785	3
Jalore	0.799	1	0.976	2	0.989	3
Jhalawar	0.742	1	0.977	3	0.944	2
Jhunjhunu	0.695	3	0.654	1	0.658	2
Jodhpur	0.696	1	0.756	2.5	0.756	2.5
Kota	0.715	1	0.862	3	0.818	2
Nagaur	0.734	1	0.781	3	0.750	2
Pali	0.717	2	0.724	3	0.666	1
Sawai Madhopur	0.713	1	0.861	2	0.903	3
Sikar	0.677	1	0.752	3	0.723	2
Sirohi	0.702	1	0.715	2	0.790	3
Tonk	0.739	1	0.787	2	0.852	3
Udaipur	0.648	3	0.567	1	0.579	2
Rank Total (R_i)		35		61.5		59.5
Mean	0.702		0.790		0.782	

$$|R_{t_1} - R_{t_3}| = 24.5$$

$$|R_{t_2} - R_{t_3}| = 2.00$$

The critical difference (C.D.) at 1 per cent level of significance was computed as 21.27. The difference between the periods t_1 and t_2 , and t_1 and t_3 was found significant whereas difference between infrastructural development in the period t_2 and t_3 was observed to be non-significant. This indicates that infrastructural development in the last two periods remained equal.

The perusal of the table further shows that mean value of composite index has increased from 0.702 in the year 1980-81 to 0.790 in the year 1990-91 which indicates that level of infrastructural development has gone down. Further it can be observed from the table that mean composite index value has decreased from 0.790 in the year 1990-91 to 0.782 in the year 1996-97 which depicts the improvement in the infrastructural development. This may be due to the efforts made by the government to develop infrastructural facilities.

CONCLUSION

- (i) For the selected points of time, Udaipur,

Bhilwara, Ajmer, Jaipur and Jhunjhunu, districts were found to be better developed in comparison with other districts. Jalore, Jhalawar, Barmer, Bundi, Sawai Madhopur and Ganganagar were identified as poorly developed districts in infrastructural sector.

- (ii) Mean values of composite indices revealed that the level of infrastructural development has gone down from the year 1980-81 to 1990-91 whereas improvement was observed from the year 1990-91 to 1996-97.

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INFORMATION SOURCES AND CHANNELS UTILIZED BY GINGER GROWERS IN UDAIPUR DISTRICT OF RAJASTHAN

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ABSTRACT

The present study was conducted in Udaipur district of Rajasthan. There are total eleven tehsils in Udaipur district, out of which two tehsils namely, Jhadol and Gogunda were selected on the basis of maximum area under ginger cultivation. Five villages from each identified tehsil were selected on the basis of maximum area under ginger cultivation. For selection of respondents, 100 ginger growers were randomly selected from identified villages (10 from each village) for data collection. The study shows that majority of respondents (65.00%) fell in medium level of sources and channels utilized whereas, 23.00 per cent ginger growers were observed in the high level of sources and channels utilized and remaining 12.00 per cent respondents were under low level of sources and channels utilized about improved ginger production technology. Findings also revealed that neighbor, friends, and progressive farmers were considered as important sources of information, whereas AO and AAO of Horticulture Department, personnel of Krishi Upaj Mandi and Input dealers were less available sources of information for ginger growers.

INTRODUCTION

Ginger the underground stem, or rhizome, of the plant has been used as spice and medicine to help digestion and treat stomach upset, diarrhea, and nausea. Ginger has also been use to help treat arthritis, colic, and heart conditions. Ginger is an aromatic spicy-swollen rhizome often dried and grounded to a yellow powder and widely used as a flavor in biscuits, cake, cookies or preserved in syrups. Ginger is an underground stem called rhizome of the plant, it is rich in starch, volatile oil and protein. It contains 2-3% proteins, 0.9% fats, 2.4% fiber, 12.3% carbohydrates and is good source of vitamins, minerals and trace elements.

In Rajasthan, ginger crop is cultivated mainly in Udaipur, Dungarpur and Baran districts, producing total of 246 tons in 122 ha. The climatic conditions of the Udaipur district are most suitable for cultivation of ginger but the production of this crop is very less and production decreases year after year very rapidly.

RESEARCH METHODOLOGY

The present investigation was conducted in Udaipur district of Rajasthan because of the selected district has the highest area and great potential of

increasing production and productivity under ginger crop. The selected district consists of eleven tehsils, out of which two tehsils, namely jhadol and gogunda with maximum area under ginger crop were selected for the study purpose. Five villages from each tehsil were identified on the basis of maximum area under ginger crop. Thus, in all ten villages were selected for the present investigation. A comprehensive list of ginger growers prepared with the help of village patwari and agriculture supervisor of respective village, out of list 10 farmers were selected from each village on the basis of random sampling technique. Thus, total 100 farmers were selected for present investigation. Data were collected by personnel interview technique through suitable structured schedule. Thereafter, data were tabulated, analysed and inferences were drawn in light of the objective.

RESULTS AND DISCUSSION

Distribution of respondent according to sources and channels of agriculture information utilized by ginger growers

To get an overview of the sources and channels available, the respondent were grouped into (i) low (<27.75), (ii) medium (27.75 to 32.28) and high (>32.28) level on the basis of calculated mean and standard

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Table 1. Distribution of respondent according to sources and channels of agriculture information utilized by to the ginger growers for seeking information on ginger cultivation

No.	Sources and channels utilized	Jhadol tehsil		Gogunda tehsil		Total	
		f	%	f	%	f	%
1.	Low (<27.75)	5	10.00	7	14.00	12	12.00
2.	Medium (27.75 to 32.28)	34	68.00	31	62.00	65	65.00
3.	High (>32.28)	11	22.00	12	24.00	23	23.00
	Total	50	100	50	100	100	100

n=100

f = frequency, % = per cent

deviation of scores obtained by the respondents. The results are presented in the Table 1.

The data in Table 1 reveal that out of 100 respondents, majority of respondents (65.00%) fell in medium level of sources and channels utilized whereas, 23.00 per cent ginger growers were observed in the high level of sources and channels utilized group and remaining (12.00%) respondents were under low level of sources and channels utilized about improved ginger production technology.

Analysis of table further reveals that 10.00 and 14.00 per cent respondents were observed in low level of sources and channels utilized group in Jhadol and Gogunda tehsils respectively. While, 68.00 and 62.00 per cent respondents were observed in medium level of sources and channels utilized group in Jhadol and Gogunda tehsils respectively. Whereas, 22.00 and 24.00 per cent respondents were observed in high level of sources and channels utilized group in Jhadol and Gogunda tehsils respectively.

Relative importance of sources of agriculture information utilized by the ginger growers for seeking information on ginger cultivation

This section deals with the different information sources used by the respondent in getting agriculture information. All possible sources were included in the study which are listed in Table 2. The sources were accorded rank based on the mean percent score.

A close observation of data reveals that among all twelve sources of information neighbor was considered important source with MPS 84.66 and was utilized most for seeking information pertaining to

Table 2. Sources of agriculture information available to the ginger growers

No.	Sources	MPS	Rank
1.	Neighbor	84.66	I
2.	Friends	77.00	II
3.	Relatives	36.66	VI
4.	Progressive farmers	54.33	III
5.	Village leaders	38.66	V
6.	Input dealers	34.66	IX
7.	Personnel of krishi upaj mandi	34.33	X
8.	Gram panchyat	35.00	VIII
9.	Agriculture Supervisor	40.33	IV
10.	AAO of Horti. Deptt	34.00	XI
11.	AO of Horti. Deptt.	33.33	XII
12.	SMS of KVK	35.33	VII

f = frequency, % = per cent

ginger cultivation by the respondents and was ranked first. This was followed by friends with MPS 77.00 ranked second by ginger growers. Other sources of information were Progressive farmers with MPS 54.33, Agriculture Supervisor with MPS 40.33, Village leaders with MPS 38.66, relatives with MPS 36.66, SMS of KVK with MPS 35.33, gram panchyat with MPS 35.00, Input dealers with MPS 34.66, Personnel of krishi upaj mandi with MPS 34.33, AAO of Horticulture Department with MPS 34.00 and AO of Horticulture Department with MPS 33.33 and were ranked third, fourth, fifth, sixth, seventh, eighth, ninth, tenth, eleventh and twelfth respectively by ginger growers.

Channels of agriculture information available to the ginger growers for seeking information on ginger cultivation

This section deals with the different information channels used by the respondents in getting agriculture information. All possible channels were included in the study, which are listed in Table 3. The channels were accorded rank based on the mean percent score.

Table 3. Channels of agriculture information available to the ginger growers

No.	Channels	MPS	Rank
1.	Radio	93.66	I
2.	T.V.	83.66	II
3.	Demonstration	34.00	IX
4.	Exhibitions	34.33	VIII
5.	Training	40.66	III
6.	Field day	35.00	VI
7.	Kisan mela	34.66	VII
8.	Leaflet & folders	35.66	V
9.	News papers	36.00	IV
10	Computer & internet	33.33	X

MPS = Mean per cent score

A close observation of data reveals that among all ten channels of information, radio was considered important channel with MPS 93.66 and was utilized most for seeking information pertaining to ginger cultivation by the respondents, and was ranked first. This was followed by T.V. with MPS 83.66, ranked second by ginger growers. Other channels of

information were training with MPS 40.66, news papers with MPS 36.00, leaflet & folders with MPS 35.66, field day with MPS 35.00, Kisan mela with MPS 34.66, exhibitions with MPS 34.33, demonstration with MPS 34.00 and computer & internet with MPS 33.33 and were ranked third, fourth, fifth, sixth, seventh, eighth, ninth and tenth respectively by ginger growers.

CONCLUSION

The study shows that majority of respondents (65.00%) fell in medium level of sources and channels utilized group whereas, 23.00 per cent ginger growers were observed in the high level of sources and channels utilized group and remaining (12.00%) respondents were under low level of sources and channels utilized about improved ginger production technology. Findings revealed that neighbor, friends and progressive farmers were considered as important available sources where as Radio, T.V. and training were most commonly available channels to the ginger growers.

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IMPACT ANALYSIS OF FLDs ON WHEAT VARIETY (RAJ- 4037) IN SIKAR DISTRICT OF RAJASTHAN

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ABSTRACT

The KVK, Fatehpur has carried out 143 FLDs on wheat (Raj.-4037) in 18 adopted villages covering an area of 56 hectares during 2010-11 to 2014-15 to exhibit latest proven technologies & to know the productivity & economics of demonstrations compared with farmer's practices. The average yield of five years data was recorded 46.57 qt ha⁻¹ in FLDs and 38.07 qt ha⁻¹ in farmers practice with an additional yield of 8.5 qt ha⁻¹ and productivity increased by 22.24 per cent. The average technology gap and extension gap were found 13.42 and 8.48 qt ha⁻¹ respectively. The results shows positive effect of FLDs of HYVs (Raj-4037) & new proven technologies of wheat over the existing practices towards enhancing the productivity of wheat in the district.

INTRODUCTION

Wheat (*Triticum aestivum* L.) ranks second in area and production in India. Wheat is one of the important cereals Rabi crop grown in all over the Rajasthan. Area, production and productivity of wheat crop during 2013-14 in Sikar district was 101345 ha., 334477 metric ton and 3300 kg ha⁻¹ respectively. The productivity of wheat in the district (32.70 qt ha⁻¹) is very low as compared to potential yield of new varieties (60 qt ha⁻¹). The productivity of this crop is low in the district due to poor adoption of improved technologies of wheat by the farmers. Therefore, it is very essential to demonstrate the high yielding varieties which are resistant to biotic and abiotic stress and other production technologies, which the farmers generally do not adopt. Hence, the Krishi Vigyan Kendra (KVK), Fatehpur has organized Front Line Demonstrations (FLD's) with improved variety (Raj. 4037, Raj. 4120) along with recommended package of practices. The main purpose of these demonstrations was to enhance the productivity levels of farmers and to transfer the latest production technology to farmers in the district. Realizing the importance of FLD in transfer of technology, it was thought appropriate to undertake the study with a view to evaluate the impact of FLD on wheat with the following specific objectives.

1. To assess the improved practice and farmers practice of wheat production.

2. To study the productivity and economics of frontline demonstrations on farmers field.
3. To identify the impact of horizontal spread of new variety and technologies.

RESEARCH METHODOLOGY

Krishi Vigyan Kendra (KVK), Fatehpur- Sikar conducted 143 FLDs on wheat at farmer's fields in 18 villages under four Panchayat Samiti of Sikar district of Rajasthan during 2010-11 to 2014-15. The required inputs were supplied by KVK and regular visits to the demonstration fields by KVK scientists ensured proper guidance to the farmers.

The data were collected from reports of FLDs conducted by KVK on the production technology of wheat crop were used. These were compared with prevailing production technologies of wheat crop (which were taken in check plot). The recommended package of practices under FLDs and farmers practices are depicted in Table No.1. The performance of improved variety (Raj. 4037) with improved technologies were evaluated closely by the organizing field days, kisan gosathies, off campus trainings and method demonstrations to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The data output were collected from both FLD as well as control plots and cost of cultivation, net income and benefit cost ratio were also work out. The technology gap & extension

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Table 1. Comparison between improved practices and farmers practices of wheat

S.No.	Particular practice	Improved practice	Farmers practice
1.	Improved variety	Raj. 4037	Raj- 3077,Raj-3765 and Raj-1482
2.	Seed rate	100 kg	125-150 kg
3.	Seed treatment	Thiram 2 gm + vitavax 1.5 gm, Chloropyriphos 20 EC 4.5 ml/ kg seed & Azotobactor + PSB culture	Use only Chloropyriphos 20 EC with improper method
4.	Sowing method	Line sowing (seed drill), 22.5 cm	Broadcasting and line sowing
5.	Basal application of fertilizer	45 kg N + 35 kg P ₂ O ₅	Less quantity applied without knowledge of right method
6.	Top dressing of urea	45 kg in two split doses at first and second irrigation	Less quantity at first irrigation
7.	Weed management	2, 4-D 750 ml/ha. 30 DAS	No proper dose of 2, 4-D
8.	PP measures	Need based spray of pesticides	No use of pesticides

gap has been computed.

Assessment of production technology in FLD plots and farmer's practices:

The records of recommended production technology of wheat in FLD plots were compared with the farmers practices adopted in local check plots. Table 1 indicates that under FLDs only recommended high yielding varieties like Raj-4037 @ 100-125 kg per ha. were sown in line (22.5 cm) after seed treatment with Carbendazim 2 gm, vitavax 1.25

gm and Chlorpyriphos 20 EC 4.5 ml per kg seed followed by seed treatment with Azotobactor and PSB biofertilizers. 45 kg nitrogen and 35 kg P₂O₅ per ha, were applied as based application. Top dressing was done with 45 kg nitrogen per ha at first and second irrigations. Whereas, under farmers practice, they used their own seed of old varieties, applied higher seed rate @ 125 to 150 kg per ha without seed treatment and mostly broadcasting method was adopted in sowing with low quantity of fertilizer at the time of basal and top dressing by the farmers.

Table 2. Production performance of wheat crop grown under FLD and existing practices

Year	Varieties	No. of demo.	Area (ha.)	Potential yield (q/ha)	Average yield (q/ha)		% increase over local	Av. Yield of district (q/ha)	Tech. gap (q/ha)	Extension gap (q/ha)
					Demo	Local practice				
2010-11	Raj 4037	28	10.0	60	46.23	39.23	17.84	34.09	13.71	7.00
2011-12	Raj 4037	25	10.0	60	45.24	36.92	22.53	26.65	14.76	8.32
2012-13	Raj 4037	25	10.0	60	49.48	38.80	27.52	32.90	10.52	10.68
2013-14	Raj 4037	25	10.0	60	48.64	39.00	24.72	33.00	11.36	9.64
2014-15	Raj 4037	40	16.0	60	43.25	36.48	18.57	31.82	16.75	6.77
Overall	143	56.0	60	46.57	38.07	22.24	31.69	13.42	8.48	

Technology Gap = Potential Yield – Demonstration Yield, **Extension Gap** = Demonstration Yield – Control Plot Yield

RESULTS AND DISCUSSION

A. Production & profitability performance of wheat crop under FLD as compare to existing farmer's practices:

The yield performance results of wheat crop obtained under demonstrations and farmers practice during five years are presented in Table 2.

The average yield of five years data was recorded 46.57 qt ha⁻¹ in FLDs and 38.07 qt ha⁻¹ in farmers practice with an additional yield of 8.5 qt ha⁻¹ and productivity increased by 22.24 per cent. The average technology gap and extension gap were found 13.42 and 8.48 qt ha⁻¹ respectively. The maximum average yield in the FLD field was recorded 49.48 qtl ha⁻¹ in 2012-13 while minimum yield 43.25 qtl ha⁻¹ in 2014-15. It is clear show that maximum 27.52 per cent yield increase over control plot during the 2012-13, it was followed by 17.84%, 22.53%, 24.72% and 18.57% in each study year due to use of HYV, better quality input and scientific backup by KVK scientists time to time. Maximum extension gap (10.68) recorded in 2012-13 which was later on decreased up to 7.0, 8.32, 9.64 and 6.77 in all respective years. The level of yield is considerably low under farmer's practice because of poor adoption of improved practices depending upon the amount of risk involved in terms of cost, skill and knowledge about the improved practices. The finding is in line with the findings of Balai, *et al.* (2012) in Rapeseed and Mustard crop Dhaka *et al.* (2010) in maize FLDs and Sharma & Choudhary (2014) in wheat FLDs.

B. Economic analysis of FLD wheat & farmer's practice

The economic analysis presented in table 3 indicate that yield performance of FLDs was recorded higher average gross return (Rs 106168 ha⁻¹), net return (Rs. 74968 ha⁻¹) with higher cost benefit ratio of 2.86 as compare to farmer's practice in the year 2012-13.

Similarly, in other study years the net profit from improved practices was observed more than farmer's practice as a result of FLDs showed positive impact of demonstrations, trainings & other supportive activities of KVKs. Similar findings were also reported by Asiwal, *et al.* (2014) in Groundnut crop, Joshi *et al.* (2014) in wheat crop and Meena *et al.* (2012) in Mung bean.

C. Horizontal spread of technologies

Table 4 reveals that horizontal spread and adoption of technology was observed maximum in HYV and Balance use of fertilizer among 320 farmers of adopted & nearby 40 villages spread over more than 400 hectare area. It might be due to the popularization of advance technologies and approaching the KVK personnel to farmers of nearby villages to beneficiaries with personal contact, field days, kishan gosthies and other social occasions. Similar findings were also reported by Asiwal, *et al.* (2015) in Mungbean FLDs.

CONCLUSION

From the study it is concluded that after

Table 3. Economics of Front Line Demonstration of wheat

Year	Av. Cost of cultivation (Rs. /ha)		Av. gross return (Rs. /ha)		Av. Net return (Rs. /ha)		B:C Ratio	
	IP	FP	IP	FP	IP	FP	IP	FP
2010-11	23050	22500	71726	62076	48676	39576	3.11	2.76
2011-12	25650	25300	77594	63568	51944	38268	3.02	2.51
2012-13	31200	29600	106168	84580	74968	54980	3.40	2.86
2013-14	33400	31000	105824	85200	72424	54200	3.17	2.75
2014-15	35500	32600	101638	85716	66138	52416	2.86	2.57
Total/Av.								

IP= Improved practice, FP= Farmer's Practice

Table 4. Horizontal spread of technologies in the neighboring villages

No.	Technology demonstrated	Horizontal spread of technology			Details of popularization methods suggested to the Extension system
		No. of village	No. of farmers	Area in ha	
1	Improved variety	40	320	400	- Institutional trg. (On- Campus)
2	Seed rate & plant spacing	20	200	250	- Village level trg. (Off- Campus)
3	Seed treatment	18	220	200	- Farmers scientist interaction
4	Weed mgt	14	100	100	- Demonstration method
5	Plant Protection measures	10	80	100	- Literature
6	Balance use of fertilizer	40	320	400	- Kisan mela
7	Harvesting & storage	08	50	60	- Telephone helpline - Field days, kisan Goshti

conduction of FLDs of wheat variety Raj-4037 at farmer's field the average yield of five years data was recorded 46.57 qt ha⁻¹ in FLDs and 38.07 qt ha⁻¹ in farmers practice with an additional yield of 8.5 qt ha⁻¹ and productivity increased by 22.24 per cent. The average technology gap and extension gap were found 13.42 and 8.48 qt ha⁻¹ respectively. The result shows positive effect of FLDs of new HYVs of wheat (Raj-4037) over the existing practices towards enhancing the productivity of wheat in the district.

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IMPACT OF EDUCATION ON KNOWLEDGE OF ANGANWADI WORKERS ABOUT NUTRITION

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ABSTRACT

Nutrition and health education is a key component of the work of the Anganwadi workers. The present research was conducted in purposively selected Ajmer and Udaipur district of Rajasthan. A sample of 60 anganwadi workers from four anganwadi workers training centers were taken for the purpose of study. A positive significant relationship found between educational level of AWWs and their knowledge of nutrition. Nutritional knowledge score went on increasing with increased educational level of AWWs.

INTRODUCTION

Integrated Child Development Services (ICDS) scheme is the largest programme for promotion of maternal and child health and nutrition not only in India, but in the whole world. An anganwadi worker is a community based honorary worker of the ICDS team. Anganwadi workers (AWWs) are expected to deliver the nutrition knowledge at the field. She is also responsible for growth monitoring of children under five. In such a case her educational level may play an important role in execution of job responsibilities at the field level. Parliament standing committee on empowerment of women suggest that in future a minimum educational qualification of 10th standard for AWWs may be fixed for urban/rural areas so that the designated objectives of the flagship programme of the country may be achieved in the right earnest (Eighth report, committee on empowerment of women, 2011).

Although much of the researches have been done on impact of education on job performance of anganwadi workers but very less focus has been shifted over impact of education on nutritional knowledge of the anganwadi workers, who are actually the main resource person of the programme and whose knowledge and skills do have a direct impact on the implementation of the programme and health of the people. Anganwadi workers play an significant role due to their close and continuous contact with the people of community, especially the children and women. So there is an utmost need to assess the impact of education on nutritional knowledge of anganwadi workers. Thus, the present

study has been taken up with the objectives assessing the impact of education on knowledge of anganwadi workers about nutrition.

RESEARCH METHODOLOGY

There were total 21 Anganwadi training centers (AWTCs) in Rajasthan state. The present study was conducted in the purposely selected Ajmer and Udaipur district of Rajasthan as the researcher is well acquainted with the study area. There were four and three AWTCs in Ajmer and Udaipur district respectively, out of which 2 AWTCs were selected from each district for the study purpose based on feasibility and level of cooperation ensured by them.

From the selected AWTCs a sample of 60 anganwadi workers was selected randomly in such a manner that numbers of anganwadi workers from each AWTC were equal. Self-made research tool was used for the data collection. Tool consisted two section *i.e.* Performa containing information regarding their educational level and questionnaire. A Questionnaire consisting of 50 items, derived from anganwadi workers training syllabus was constructed. These items were carefully scrutinized by a team of experts. The questionnaire was consisting of questions regarding basic nutrition, nutrition for vulnerable groups and growth monitoring of young children.

RESULT AND DISCUSSION

Existing educational level of anganwadi workers

In the present study 58.33 per cent AWWs were found to be below 12th class education. Out of them 8.33 per cent had only primary education, 23.33 per

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cent studied up to middle school and 26.67 per cent were mariculated. Only two AWWs had post-graduation and other degree (Table 1).

Table 1. Percentage distribution of anganwadi workers by their educational level

n=60		
No.	Educational level	Percentage
1.	Primary	8.33
2.	Middle school	23.33
3.	Secondary	26.67
4.	Senior secondary	25.00
5.	Bachelor degree	13.33
6.	Post graduate degree	1.67
7.	Other degree	1.67

Relationship between educational level and knowledge of AWWs about overall nutrition

Education is a most crucial investment in human development. Education strongly influences improvement in health, hygiene, demographic profile, productivity and practicality all that is connected with the quality of life.

Table 2 reveals that none of the AWW fell into the excellent category of overall nutrition knowledge. A majority (80%) of primary educated AWWs were fall under the poor category of overall nutrition

knowledge with mean score of 12.60. Nearly half (42.85) of the AWWs those studied up to middle school were fall into average category of overall nutrition knowledge. A majority (68.75%) of secondary educated AWWs were fall into average category of overall nutrition knowledge. AWW those studied up to 12th class 40 per cent fall into the good category and 46.67 per cent fall into the average category of overall nutrition knowledge. None of the AWWs those had bachelor degree fall into the poor category of overall nutrition knowledge. Highest mean score (31) was obtained by post graduated AWWs.

Relationship between overall nutrition knowledge of AWWs and their educational level ($r=0.506, P<0.01$)

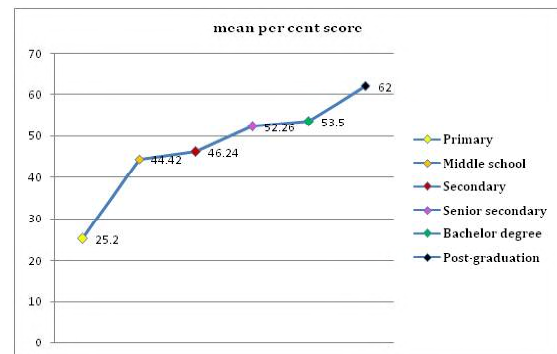


Fig. 1. Nutritional knowledge of anganwadi workers in relation to their educational level

Table 2. Distribution of anganwadi workers by their educational level and overall nutrition knowledge score

No.	Educational level	Categories				Mean \pm SD(SE) Maximum score = 50
		Excellent	Good	Average	Poor	
1.	Primary	-	-	1.66 (1)	6.66 (4)	12.60 \pm 8.96(4.00)
2.	Middle school	-	3.33 (2)	11.67 (7)	8.33 (5)	22.21 \pm 5.80(1.55)
3.	Secondary	-	1.66 (1)	18.33 (11)	6.66 (4)	23.12 \pm 5.43(1.35)
4.	Senior secondary	-	10.00 (6)	11.66 (7)	3.33 (2)	26.13 \pm 4.88(1.26)
5.	Bachelor degree	-	1.66 (1)	11.66 (7)	-	26.75 \pm 2.55(0.90)
6.	Post graduation	-	1.66 (1)	-	-	31.00 \pm 0.00(0.00)
7.	Other degree	-	-	1.66 (1)	-	24.00 \pm 0.00(0.00)
Overall		-	11	34	15	23.42 \pm 6.44(0.83)

Figure in parenthesis is number of anganwadi workers

were found to be positively significant at 1 percent level of significance and fig.1 clearly shows that as the educational level increases the nutrition knowledge of AWWs also increases. Education leads to better understanding and retaining capacities. Thakare et al. (2012) found that half of the AWWs were matriculate and they had 77.14 per cent knowledge of nutrition and health education. Findings are supported by Zanetti (2012) reported a significant positive correlation between education and acquisition of knowledge. This findings are also similar to result reported by Jena (2013) that level of education is positively associated with the knowledge score about the ICDS scheme.

CONCLUSION

Education level has positive impact on nutritional knowledge of anganwadi workers. Higher education level of anganwadi worker ensures effective delivery of nutrition and health education to the community. In order to improve the quality of nutrition and health education provided by anganwadi workers higher educational level should be fixed as minimum required qualification for recruitment as anganwadi worker.

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IMPACT OF AGRICULTURAL TECHNOLOGY MANAGEMENT AGENCY ON ADOPTION OF MUSTARD PRODUCTION TECHNOLOGY BY BENEFICIARY AND NON-BENEFICIARY FARMERS

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ABSTRACT

The research was conducted purposely in Alwar district of Rajasthan. Three panchayat samities namely Behror, Laxmangarh and Mundawar were selected for the investigation where trainings were conducted under ATMA on mustard crop. In all, 100 beneficiary and 100 non-beneficiary farmers were selected randomly making the total sample of 200 respondents. Majority of the mustard growers (56.50%) were having medium adoption level followed by low (25.50%) and high (18.00%) adoption level of improved mustard cultivation practices. Significant difference was observed in the adoption of mustard technology between of beneficiary and non-beneficiary farmers in the study area.

INTRODUCTION

A new approach for transfer of technology in the name of Agricultural Technology Management Agency (ATMA) was tested in 28 districts of the country, under the Innovation Technology Dissemination (ITD) component of National Agriculture Technology Project (NATP) in 1998. Looking to the impressive results of the experimental implementation of ATMA, the Ministry of Agriculture, GOI launched centrally sponsored scheme, "Support to rammes for Extension Reforms" for revitalizing agriculture extension. The scheme recommends setting up of an autonomous district level institution called as Agricultural Technology Management Agency (ATMA) headed by District Collector with participation of various key stakeholders involved in Agricultural activities for sustainable agricultural development. The district level autonomous body facilitates convergence of programmer of all the line departments in agriculture and allied sectors while fostering public-private participation on a prioritized agenda emerging out of Strategic Research and Extension Plan (SREP) for the district. The ATMA scheme has been implemented 11 districts of Rajasthan in Oct. 2005. Later on in the year 2007 ATMA has been started in all remaining districts of Rajasthan.

Mustard is one of the important oil seed crops of

the India. In India, area is 5.92 million hectare and production is 6.78 MT of mustard with an average productivity of 1145 kg/ha during 2011-12. In Rajasthan, mustard is cultivated over an area of 25.30 lakh ha with the production of 27.00 lakh tones with the average yield is 1068 kg/ha. In Rajasthan mustard is mostly cultivated in Alwar, Bharatpur, Sawaimadhopur, Karoli, Dholpur, Jaipur, Sikar, Jhunjhunu and Sri Ganganagar districts. There has been a gap between potential & actual yield of mustard in the state. Hence assess the extent of adoption of recommended mustard production technology by the beneficiary and non-beneficiary farmers.

RESEARCH METHODOLOGY

The research was conducted purposely in Alwar district of Rajasthan. Three panchayat samities namely Behror, Laxmangarh and Mundawar were selected for the investigation where trainings were imported under ATMA on mustard crop. From the above mentioned three panchayat samities, The Department of Agriculture, Govt. of Rajasthan has imparted six days training on mustard production technology in six villages under ATMA Programme. All the respondents who have received training on mustard production technology were included for study purpose and called as beneficiary farmers, and 100 beneficiaries were selected randomly. Further, village wise list of mustard growers who have not

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received any training regarding mustard production technology were prepared were also help of Agriculture Supervisor, Deptt. of Agriculture. From the list, equal number of respondents that of beneficiary will be selected randomly and called as non-beneficiary respondents. In all, 100 beneficiary and 100 non-beneficiary farmers were selected making the total sample of 200 respondents. Data were collected by personal interview method.

RESULTS AND DISCUSSION

(A) Adoption of mustard production technology by beneficiary and non-beneficiary farmers

Trainings conducted by ATMA were supposed to have imparted sufficient skill pertaining to the adoption of mustard production technology.

Table 1 show that, in case of beneficiary mustard growers, majority of them (55 farmers i.e. 55.00%) had medium level of adoption followed by high (27

farmers i.e. 27.00%) and low adoption category (18 farmers i.e. 18.00%). Further, in case of non-beneficiary farmers, majority of the farmers i.e. 58 (58.00%) belonged to medium adoption category followed by low adoption category (33 farmers i.e. 33.00%). Only 9 (09.00%) non-beneficiary mustard growers fell in high adoption category concerning mustard production technology. If we look at the data presented in the table-I as a whole, irrespective of type of farmers i.e. Beneficiary and Non-Beneficiary farmers, the data revealed that only 36 (18.00%) farmers were high adopters, 113 (56.50%) farmers were medium level adopters and 51 (25.50%) farmers were in the category of low adoption of mustard cultivation practices in the study area.

The findings are in line with the findings of Ranish *et. al* (2001) and Singh and Singh (2002) found that the majority of the farmers belonged to the medium adoption category about mustard production

Table 1. Distribution of mustard growers according to their extent of adoption

Sr. No	Extent of adoption	Beneficiary Farmers (n=100)		Non-Beneficiary Farmers (n=100)		Pooled (n=100)	
		f	%	f	%	F	%
1	Low (<49 score)	18	18.00	33	33.00	51	25.50
2	Medium(49-69 score)	55	55.00	58	58.00	113	56.50
3	High (>69 score)	27	27.00	9	09.00	36	18.00

f = frequency, %= Percentage, n= number of respondents

Table 2. Practice-wise adoption of mustard technology by beneficiary and non-beneficiary farmers

Sr. No	Package of practices	Beneficiary Farmers (n=100)		Non-Beneficiary Farmers (n=100)		Pooled (n=100)	
		MPS	Rank	MPS	Rank	MPS	Rank
1	Field preparation	84.33	III	81.33	III	82.83	III
2	Soil Treatment	12.00	X	8.00	X	10.00	X
3	High yielding varieties	100.00	I	100.00	I	100.00	I
4	Seed treatment	48.67	VIII	30.67	VIII	39.67	VIII
5	Time of sowing, seed rate and spacing	72.00	V	64.75	IV	68.38	V
6	Manure and fertilizer application	62.33	VI	44.83	VI	53.58	VI
7	Irrigation management	80.00	IV	64.50	V	72.25	IV
8	Weed management	56.67	VII	35.33	VII	46.00	VII
9	Plant protection measures	25.67	IX	17.33	IX	21.50	IX
10	Harvesting, threshing & storage	88.44	II	86.33	II	87.39	II
Overall		63.01	$r_s=0.99$	53.30	$t=18.00$ **	58.16	

r_s = Rank correlation, ** = Significant at 1% level of significance

technology.

If we look at Table 2 irrespective of Beneficiary and Non-Beneficiary farmers, then it is observed that respondents had very good adoption level regarding high yielding varieties, harvesting, threshing & storage, field preparation and irrigation management with 100, 87.39, 82.33 and 72.25 MPS, respectively. They had good amount of adoption level regarding time of sowing, seed rate & spacing and manure & fertilizer application with 68.38 and 53.58 MPS followed by low adoption level in practices like weed management, seed treatment, plant protection measures and soil treatment with 46.00, 39.67, 21.50 and 10.00 MPS, respectively. The overall extent of adoption of the trained farmers (58.38 MPS) was higher than the follower farmers (49.69 MPS).

The value of calculated rank correlation (r_s) was 0.99 which is positive and significant at 1 per cent level of significance, leading to conclusion that there was a similarity in rank assignment pattern of adoption level of Beneficiary and Non-Beneficiary farmers about mustard production technology, though there was a difference in the magnitude of MPS of Beneficiary and Non-Beneficiary farmers.

(B) Comparison of extent of adoption between Beneficiary and Non-Beneficiary farmers

Table 3 elucidates that among ten important

packages of practices of mustard production, three practices i.e. field preparation, soil treatment and harvesting, threshing & storage, showed non-significant difference in the adoption level of beneficiary and non-beneficiary farmers. In remaining seven practices of mustard cultivation i.e. high yielding varieties, seed treatment, time of sowing, seed rate and spacing, manure and fertilizer application, irrigation management, weed management and plant protection measures, there was a highly significant difference in the adoption level of beneficiary and non-beneficiary farmers as their calculated 'Z' value was higher than the tabulated value at 1 per cent level of significance. Leading to the conclusion that there was a noteworthy difference in extent of adoption between beneficiary and non-beneficiary farmers regarding mustard production technology. Thus, this was proved evidently that the adoption of mustard cultivation practices was more among beneficiary farmers as compared to non-beneficiary farmers. It might be due to the fact that beneficiary farmers remained in continuous touch with the extension personnel throughout the session of the training so they might have acquired sufficient skills pertaining to mustard cultivation practices. Thus they are more likely to practice the learnt skills in their fields.

The findings of the study are in compliance with

Table 3. Practice wise comparison of extent of adoption between Beneficiary and Non-Beneficiary farmers regarding mustard production technology

Sr. No	Package of practices	Beneficiary Farmers (n=100)		Non-Beneficiary Farmers (n=100)		'Z' Value
		Mean \pm	S.D.	Mean \pm	S.D.	
1	Field preparation	5.06	1.28	4.88	0.99	1.11 ^{NS}
2	Soil Treatment	0.60	1.63	0.40	1.36	0.94 ^{NS}
3	High yielding varieties	18.00	0.00	18.00	0.00	0.94 ^{NS}
4	Seed treatment	4.38	3.72	2.76	2.75	3.50**
5	Time of sowing, seed rate and spacing	5.76	1.42	5.18	2.20	2.22*
6	Manure and fertilizer application	7.48	2.08	5.38	2.64	6.25**
7	Irrigation management	4.80	1.47	3.87	1.77	4.04**
8	Weed management	5.10	2.15	3.18	1.89	6.71**
9	Plant protection measures	4.62	3.02	3.12	2.95	3.55**
10	Harvesting, threshing & storage	7.96	1.53	7.77	1.05	1.02 ^{NS}
Overall		6.38	1.83	5.45	1.76	3.63**

NS = Non-significant, ** = Significant at 1% level of significance

the findings of Singh, N. Bareth, L.S. and Sharma, A.K. (2009), Lakhera and Sharma (2002), Kumar (2001) and Singh (2004) found that improved seed, field preparation, irrigation management, sowing time and harvesting, threshing & storage good adoption regarding mustard production technology.

CONCLUSION

Majority of mustard growers had good adoption about improved package of practices of mustard cultivation. Beneficiary and non-beneficiary farmers possessed comparatively very good adoption regarding high yielding varieties, harvesting, threshing & storage, field preparation and irrigation management. Followed by low adoption level in practices like weed management, seed treatment, plant protection measures and soil treatment. Practice wise as well as overall significant differences in existing adoption of beneficiary and non-beneficiary farmers was observed about mustard production technology.

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IMPACT OF FRONTLINE DEMONSTRATIONS ON CLUSTERBEAN PRODUCTIVITY IN FARMERS FIELD

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ABSTRACT

Cluster-bean or Guar (*Cyamopsis Tetragonoloba* (L.) Taub.) is mainly grown in north-western states of India. The development of the agriculture is primarily the application of the science and technology by making the best use of available resources. One of the major reasons behind low yield of cluster-bean is wide gap between improved package of practices & farmer practices. To replace this anomaly, Krishi Vigyan Kendra Nohar conducted frontline demonstrations at farmer's field. During the period under study, it was observed that in frontline demonstrations the improved cluster-bean variety HG-2-20 recorded the higher seed yield 1355 kg per hectare when compared to local check 1200 kg per hectare. The percentage increase in the yield was 12.92% over local check during the course of study. Technology gap and technology index values were 445 kg per hectare and 24.72%, respectively. It is concluded that wide gap existed in potential and demonstration yield in high yield cluster-bean varieties due to technology and extension gap in Hanumangarh district of Rajasthan.

INTRODUCTION

Clusterbean or Guar (*Cyamopsis Tetragonoloba* (L.) Taub.) is mainly grown in north-western states of India. It is grown for feed and fodder purposes for livestock. In world scenario, India contributes about 75 percent cluster-bean seed production. This crop has recently been recognized as cash crop in desert region owing to its increasing industrial importance i.e. presence of cluster-bean in endosperm of its seeds. In India cluster-bean grown on 240 lakh hectare area with the production of 9.60 lakh tones and productivity 402 kg per hectare. The share of Rajasthan in cluster-bean production is 80.1 percent followed by Haryana (8.5%), Gujarat (8.3%) and Punjab (1.0%). In Rajasthan 30 lakh hectare area was covered by cluster-bean with 15.46 lakh tones production and productivity level of 515 kg per hectare (Anonymous 2010). The western arid region of Rajasthan accounts for 96 percent area of the crop and 82 percent of the production with the productivity of cluster-bean is greatly dependent on monsoon pattern. Whenever, timely rains occurs the sowing was done by the farmers in larger area and when monsoon delayed or very less rains received the area of cluster-bean crop is squeezed Singh *et al.* (2014).

Frontline demonstration may play a very important role in proper transfer of technologies and changing scientific temperament of the farmers.

Frontline demonstration is the new concept of field demonstration evolved by the ICAR with the inception of the technology mission on oilseed crops during mid-eighties. The main objective of frontline demonstrations is to demonstrate newly released crop production and protection technologies and its management practices in the farmers field under different agro-climatic regions and farming situations. The agricultural technology is not generally accepted by the farmers completely in all respects.

As such there always appears to be a gap between the recommended technology by the scientist and its modified form at the farmer's level. The technology gap is thus the major problem in the efforts of increasing agricultural production in the country. A need of the day is to reduce the technological gap between the agricultural technology recommended by the scientist and its acceptance by the farmers on their field. In view of the above factors, frontline demonstrations were undertaken in a systematic manner on farmer's field to show the worth of a new variety and convince the farmers to adopt improved cultivation practices of cluster-bean. Keeping in view the present investigation attempts to study the yield gap between frontline demonstration trials and farmers yield, extend of technology adoption and benefit cost ratio.

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RESEARCH METHODOLOGY

The study was conducted in Hanumangarh district of Rajasthan during the year 2013-14 and 2014-15. The data on output of high yield variety of cluster-bean crop and inputs used per hectare have been collected from the frontline demonstration trails conducted by KVK, Nohar. All the participating farmers were trained on various aspects of cluster-bean production technologies. Recommended agronomic practices and genuine seeds of cluster-bean were used for frontline demonstrations in 0.5 hectare area per demonstration. A one fifth area was also devoted to grow local standard check. The frontline demonstrations were conducted by KVK Nohar from Kharif 2013 to 2014 in area of 15 hectare on 30 locations (farmers). Thus, a total of 30 full package frontline demonstrations were selected. The data collected from the reports of frontline demonstrations conducted by the KVK on the production technology of cluster-bean crop were used. These were compared with prevailing production technologies of cluster-bean crop (which were taken in check plots). The performances of improved varieties with improved technologies evaluated closely by the organizing seasonal training, method demonstrations, field days and by taking crop-cut experiments. Regular diagnostic visit by the scientists helped in proper execution of demonstration as well as collection of farmer's opinion about the demonstration field. Production and economic data for frontline demonstrations and local practice were collected and analyzed.

In the present study, technology index was operationally defined as the technical feasibility obtained due to implementation of frontline demonstration in cluster-bean. To estimate the technology gap, extension gap and technology index following formulae used by Samuelet al. (2000) have been used:

Extension Gap (kg/ha) = Demonstration yield - Farmer practices yield (Local check)

Technology Gap (kg/ha) = Potential yield - Demonstration yield

Technology Index = $\frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$

RESULTS AND DISCUSSION

Performance of Frontline demonstration

A Comparison of productivity levels between demonstrated variety and local checks is shown in Table 1. During the period under study, it was observed that in front line demonstrations, the improved cluster-bean variety HG-2-20 recorded the higher seed yield (1355 kg/ha) when compared to local check (1200 kg/ha). The percentage increase in the yield over local check was 12.92%. More and less similar yield enhancement in different crops in front line demonstration has amply been documented by Hirenmath *et al.* (2007) and Patel *et al.* (2013). From these results it is evident that the performance of improved variety was found better than the local check under same environment conditions. Farmers were motivated by results of agro technologies applied in the frontline demonstrations trails and it is expected that they would adopt these technologies in the coming years. Yield of the frontline demonstration trails and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology index.

Table 1. Yield, technology gap and technology index of demonstration

Variables	Yield (kg/ha)	Increase (%) over Local Check	Tech-nology Gap (kg/ha)	Tech-nology Index (%)
Local check	1200	-	-	-
Demonstration (HG-2-20)	1355	12.92	445	24.72

Technology Gap

The technology gap shows the gap in the demonstration yield over potential yield and it was 445 kg per hectare. The frontline demonstrations were laid down under the supervision of KVK Scientist at the farmer's field. There exists a gap between the potential yield and demonstration yield. This may be due to numerous resource which affect the crop yield like weather condition, less application of inputs etc.

Technology Index

Technology Index shows the feasibility of the variety at the farmer's field. The lower the value of the technology index more is the feasibility. Results of the study depicted in Table-1 revealed that the technology index value was 24.72%. The results of the present study are in consonance with the findings of Singh *et al.* (2007) and Patel *et al.* (2013).

Economics of frontline demonstration

The economics of cluster-bean production under frontline demonstrations were estimated and the results of the study have been presented in Table 2. The results of economic analysis of cluster-bean production revealed that frontline demonstrations recorded higher gross return Rs.66400 per ha and net return Rs. 52150 per ha with higher benefit cost ratio(4.66) as compared to local checks. These results are in accordance with the finding of Hiremath *et al.* (2007) and Hiremath and Nagaraju (2009). Further, additional cost of Rs.1250 per ha in demonstration has increased additional net returns Rs.6425 per ha with incremental benefit cost ratio 6.14 suggesting it's higher profitability and economic viability of the demonstration. More and less similar results were also reported by Hiremath *et al.* (2007) Dhaka *et al.* (2010) and Patel *et al.* (2013).

Table 2: Economics of frontline demonstration

Variables	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	Benefit: Cost ratio
Local check	13000	58725	45725	4.51
Demonstration (HG-2-20)	14250	66400	52150	4.66
Additional in demonstration	1250	7675	6425	6.14*

* Incremental Benefit cost ratio

CONCLUSION

The finding of the study revealed that wide gap existed in potential and demonstration yield in high yield cluster-bean varieties due to technology and extension gap in Hanumangarh district of Rajasthan. Frontline demonstration was an effective tool for increasing the productivity of cluster-bean crop.

Improved technologies in frontline demonstrations enhanced yield and increase percent over the farmers practice in local check plots. This will substantially increase the income as well as the livelihood of the farming community. This created greater curiosity and motivation among other farmers who do not adopt improved practices of cluster-bean cultivation. The demonstrations also built the relationship and confidence between farmers and scientist of KVK.

The study emphasizes the needs to educate the farmers in adoption of improved technology to narrow the extension gaps through various technology transfer centers. Therefore it is suggested that these factors may be taken for considered to increase the scientific temperament of the farmers.

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ADOPTION OF IMPROVED CHILLI (*CAPSICUM ANNUM* L.) CULTIVATION TECHNOLOGY AMONG THE FARMERS OF DISTRICT CHITTORGARH

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ABSTRACT

The findings indicated that majority of the farmers (65.00 %) had medium level of adoption regarding improved chilli cultivation technology, while 23.33 and 11.67 per cent respondents had low and high adoption level, respectively. The study further indicated that practice wise adoption of the respondents was more in time of sowing followed by irrigation, land preparation, seed rate, seed treatment and harvesting & drying, whereas less adoption level was recorded by the farmers in practice like high yielding varieties, weed management and plant protection.

INTRODUCTION

Chilli (*Capsicum annum* L.) also known as “wonder spice” is one of the important commercial crop of Rajasthan. It is grown almost throughout the state. The major chilli growing districts are Jodhpur, Nagour, Bhilwara, Chittorgarh, Kota, Bundi etc. Chilli is known from pre-historic times in Peru and they are believed to have originated in the tropical America. Chilli is an indispensable condiment and used in the daily diet of every Indian household in one or other form. Chillies are used as whole pods, dry powder, in pickles and stuffed. Pungency in chillies is due to alkaloid capsaicin. The red colour of chillies is due to the presence of pigment capsanthin. Chilli can be grown on all type of soil from light sandy to heavy clay. It is very sensitive to water logging. The production of vegetables in India is largely in the hands of small and margin farmers and productivity is below the level as prevailing in other countries. The level of productivity is attributed to lack of high yielding varieties, pest and diseases infestation, losses due to weed emergence, post harvest handling etc. Keeping this in view, the present study was carried out with the specific objective *i.e.* to measure the extent of adoption of improved chilli cultivation technology by the farmers.

RESEARCH METHODOLOGY

The present study was conducted in Gangrar tehsil of district Chittorgarh. This area is famous for

vegetable cultivation particularly chilli. Total six villages were selected for study. For selection of respondents, a comprehensive list of all the chilli growers were prepared from selected villages. The listed farmers of each villages were categorized into three categories namely (< 1 ha land), small (1-2 ha land) and large (> 2 ha land). Then proportionate sample from each category was drawn randomly to have a total sample size 60 chilli growers. Data were collected by personal interview technique through suitable structured schedule. Thereafter data were tabulated, analyzed and inferences were drawn in light of the objective.

RESULTS AND DISCUSSION

Distribution of respondents according to their overall adoption

To get an overall view of the adoption level, the chilli growers were grouped into low, medium and high adoption level on the basis of calculated mean and standard deviation of the obtained adoption score by the respondents. Data pertaining to distribution of respondents on the basis of adoption was presented in Table 1. It reveals that majority of the respondents (65.00 %) fell in the medium level of adoption group whereas 23.33 per cent had low adoption level and only 11.67 per cent chilli growers had high level of adoption of improved chilli cultivation technology. Further, result indicated that more number of marginal farmers and small farmers

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had low level of adoption as compared to large farmers.

The adoption level of large farmers was higher than small and marginal farmers. It might be due to reason that risk bearing ability of large farmers was comparatively higher than the marginal and small farmers. Another reason behind results may be that majority of the larger farmers were educated, resourceful and had large land holdings size. The result confirms the findings of Desai *et al.* (1996) in cumin crops, Poonia and Dangi (1997) in ginger crop, Meena *et al.* (2006) in Ajwain crop and Jaitawat *et al.* (2008) in fennel crop. In accordance with the findings, it is recommended that all the categories of farmer's specially marginal and small farmers should be motivated and encouraged to enhance the level of

adoption through well planned follow up action by extension agencies/Krishi Vigyan Kendras etc.

Practice wise adoption of advance chilli cultivation technology among the farmers

Practice wise adoption of advance chilli cultivation technology by the marginal, small and large farmers was worked out. For this purpose mean per cent scores were calculated. The results about the same have been presented in Tables 2. A close examination of data (Table 2) revealed that maximum adoption level was reported in sowing time practice with mean per cent score 69.78. This was followed by the practices like irrigation, land preparation, seed rate, seed treatment and harvesting & drying with the 54.03, 50.34, 45.91, 45.14, and 43.55 % mean score, respectively. While, practices like manure & fertilizers,

Table 1. Distribution of respondents on the basis of adoption level of improved chilli cultivation

($r = 60$)

S.No.	Level of adoption	Marginal farmers		Small farmers		Large farmers		Total	
		F	%	F	%	F	%	F	%
1.	Low (<25.78)	06	30.00	05	25.00	03	15.00	14	23.33
2.	Medium (25.78 – 35.98)	12	60.00	13	65.00	14	70.00	39	65.00
3.	High > 35.98	02	10.00	02	10.00	03	15.00	07	11.67
Total		20	100.00	20	100.00	20	100.00	60	100.00

F=Frequency, %= Percentage

Table 2. Extent of adoption of improved chilli production practices by the respondents

S.No.	Improved practices	Marginal farmers MPS	Small farmers MPS	Large farmers MPS	Total MPS
1.	High yielding varieties	12.95	13.35	16.25	14.18
2.	Soil and land preparation	46.17	50.35	54.52	50.34
3.	Soil treatment	32.15	30.85	34.27	32.42
4.	Seed treatment	28.75	35.17	71.52	45.14
5.	Seed rate	52.65	37.73	47.36	45.91
6.	Time of sowing	67.75	70.25	71.36	69.78
7.	Recommended spacing	22.47	20.07	26.72	23.08
8.	Manure & fertilizer application	32.65	39.15	42.27	38.02
9.	Irrigation	45.48	52.27	64.35	54.03
10.	Weed management	4.85	5.65	7.95	6.15
11.	Plant protection measures	4.15	7.45	3.98	5.19
12.	Harvesting and drying	43.65	40.45	46.56	43.55

soil treatment, spacing, high yielding varieties, weed management and plant protection were having less adoption level with mean per cent scores 38.02, 32.42, 23.08, 14.18, 6.15 and 5.19, respectively. A close observation of the Table 2 shows that the adoption level was higher in case of the large farmers than marginal and small farmers in major areas of chilli cultivation technology. The large farmers had higher adoption level due to their better economic condition, higher education level so they availed desirable facilities that small and marginal farmers were deprived off. Therefore, it is suggested that marginal and small farmers should be well equipped and persuaded strategically for increasing the adoption level of improved technology of chilli cultivation. The finding is similar with the findings of Puranik and Verma (1992) in sweet potato and Jaitawat *et al.* (2008) in fennel crop.

CONCLUSION

The findings indicated that majority of the farmers (65.00 %) had medium level of adoption regarding improved chilli cultivation technology, while 23.33 and 11.67 per cent respondents had low and high adoption level, respectively. The study further indicated that practice wise adoption of the respondents was more in time of sowing followed by irrigation, land preparation, seed rate, seed treatment

and harvesting & drying, whereas less adoption level was recorded by the farmers in practice like high yielding varieties, weed management and plant protection.

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IMPACT OF DEVELOPED TRAINING PACKAGE ON CARD WEAVING MODULE ON KNOWLEDGE GAIN AMONG RURAL WOMEN

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ABSTRACT

The study was conducted in lakhawali village of Girwa panchyat samiti of Udaipur District of Rajasthan state. Total 30 rural women were selected for imparting knowledge through developed training package on card weaving module. Pre and post-test research design was used for present study. Findings revealed that the rural women were having very low knowledge about all the aspects of card weaving technique. The study further inferred that after exposure of training package, the gain in knowledge was found highest in aspect of Preparatory steps in card weaving and lower in shed making. Significant improvement in the knowledge was found as a result of intervention through developed training package. The pre test score of knowledge was increased from 12.6 to 60.8 per cent with the gain in knowledge of about 48.2 per cent.

INTRODUCTION

Weaving in Indian villages is considered one of the largest cottage industries. Several people are engaged in weaving cotton, silk and other natural fibres and not a single village can be found in India, where the weavers do not live. The rural women are having basic indigenous knowledge skill potential and resources to establish and manage enterprise. Women have been taking increasing interest in recent years in income generating activities. They can weave for income while sitting at home. Weaving is a tool in which they can achieve pride, dignity & financial independence. Hand weaving plays a very important role in generating productive employment in the rural areas. Tablet weaving is a method of weaving strong, narrow, decorative bands. The equipment required is very cheap and simple, yet the range of possible patterns is immense. Uses of tablet-woven bands included the decoration of clothing, and use as belts and straps.

The tablets used in weaving are typically shaped as regular polygons, with holes near each vertex and possibly at the center, as well. The number of holes in the tablets used is a limiting factor on the complexity of the pattern woven. Patterns are made by placing different-colored yarns in different holes, then turning individual cards until the desired colors of the weft are on top. After that, a simple pattern,

like a stripe, small diamond or check, can be repeated just by turning the deck of tablets. Tablet weaving is especially freeing, because any pattern can be created by turning individual tablets. This is in contrast to normal looms, in which the complexity of the pattern is limited by the number of shafts available to lift threads, and the threading of the heddles. Most card woven bands are very strong and sturdy. Card woven bands can range from simple and easy to elaborately patterned and very time consuming. One of the most common individual card manipulations is the twist. Simply rotate a card around its vertical axis. This changes the threading direction of the card as well as the color position. Card weaving is a fascinating little craft. The fascination lies, in the cleverness and ingenuity of the technique, and in the unique texture of the woven bands- strong, firm, thick and smooth- quite unlike the product of any other form of weaving. These decorative adornments are found in most cultures throughout history, which are expressed through clothes and other forms of accessories. Creativity triggers innovativeness which enable one to come out with new concepts and ideas which are relevant in the designing and implementation of fashion. Card weaving has several advantages from the point of view of income generating activities. The researcher developed a training booklet as part of Intervention package to train the rural women in the art of card weaving through developed card

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weaving module. The present study examines the impact of **developed training package on card weaving module for knowledge gain among rural women.**

RESEARCH METHODOLOGY

The training was organized to encourage the production of value-added products in order to improve the socio-economic conditions of the rural people. The researcher organized two weeks training programme at village Lakhawali of Girwa Panchayat Samiti of Distt Udaipur. Respondents were selected on the basis of their interest to learn the card weaving technique. The researcher personally approached the women of village to attend the training.

Pre and post test experimental research design was used for conducting the present investigation. The researcher administered developed training package for village intervention which included flash cards, handouts, charts, samples, products of card weaving, and a training booklet entitled 'Creating structural variations through card weaving module' that covered the developed content on six different aspects sequentially related to card weaving. The data collection was done through interview schedule, which includes socio economic background of the respondents followed by knowledge questionnaire to assess the knowledge level of respondents on different aspects of card weaving.

The knowledge score of the each respondent was calculated by assigning one mark to each correctly answered question and zero mark was given to each wrong answer. Impact assessment of developed package was done in three steps, pre-test, exposure and post-test. Before exposure of the training package, pre-test was done to find out the existing knowledge of the respondents followed by two weeks training to rural women on selected aspects. After four days of training, post test was conducted to find out the gain in knowledge on various aspects of card weaving using the same developed knowledge test which was administered during the pre-test.

RESULTS AND DISCUSSION

This part contains the outcomes of the analysis done on socio-personal profile of the respondents. The socio-personal profile of the respondents

included age, educational status, occupations of the respondents, and monthly income of the family. Data presented in Table 1 shows the Socio-personal profile of the respondents.

A. Socio-personal profile of the respondents

Table 1. Percentage distribution of subjects for selected background variables

n=30		
No. Background variables	No. of respondents (f)	Percentage of respondents (%)
1. Age (years)		
25-30	5	16.67
30-35	12	40.00
35-40	10	33.33
40-45	3	18.00
2. Education		
Upto matric	8	26.67
Secondary	15	50.00
Graduates and Above	7	23.33
3. Occupation of the respondent		
Housewife	28	93.33
Service	2	6.67
4. Monthly income of the family		
10,000-20,000	8	26.67
20,000-30,000	6	20.00
Above 30,000	16	53.33

Perusal of data in table-1 shows that majority of the respondents (40%) were in the age range of 30-35 years. Rest of the respondents i.e. 33.33 per cent, 16.67 per cent and 10 per cent were found in the age range of 35-40 years, 25-30 years and 40-45 years respectively. Regarding education, half of the respondents (50%) were secondary educated other (26.67%) were matriculate and rest of the respondents (23.33%) were graduated. The results regarding the occupation of the respondents showed that majority of the respondents i.e 93.33 per cent were housewives

and involved actively in the agricultural activities of family. A very few percentage of respondents (6.67%) belonged to service sector. It was observed that the monthly income of 26.67 per cent of the respondents' families ranged between 10,000-20,000/-, while 20 per cent had monthly income between 20,000-30,000 followed by 53.33 per cent of the respondents having monthly income above 30,000/.

B. Gain in knowledge

The statistical data regarding the knowledge level of respondents are presented in Table-2.

Overall knowledge and mean scores of respondents in each category in pre-test and post-test

Table 2. Distribution of respondents by overall knowledge and mean scores of each category in pre-test and post-test

Knowledge with score range		Percentage of the respondents		Mean percent score	
Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Low 0-7.53	Low 0-34.7	63.3	30	12.1	43.83
Medium 7.53-56.70	Medium 34.7- 69.4	36.6	70	0.88	15.5
High 56.70 & above	High 69.4 & above	-	-	-	-

Perusal of Table 2 indicate that in pre-test majority of respondents (63.3%) had low knowledge with the mean percent score of 12.1 followed by 36.6 per cent of respondents who had medium level of knowledge. Post test data revealed the significant increase in knowledge as respondents falling in medium knowledge level increased to 70 per cent whereas respondents in low knowledge level decreased considerably from 63.3 per cent to 30.

Aspect wise knowledge and mean percent score of respondents in each category in pre-test and post-test

Data in table-3 reveals information about knowledge of respondents on six different aspects of card weaving and their mean per cent scores in

pre-test and post-test. It was found that in both pre-test and post-test, out of six aspects the knowledge for aspect of *finishing of products* ranked first with overall mean per cent score of 24.6 and 78 per cent, respectively. The knowledge for aspect of *preparatory step in card weaving* ranked second with mean per cent score of 20.6 in pre-test and 75.3 in post-test.

Perusal of table 3 reveals that in all the six aspects of cad weaving i.e. preparatory steps in card weaving, pattern based threading of the holes in cards, warp winding for larger width, shed making, process of card rotation and finishing of the products, the respondents were found in category of low in knowledge during pre testing as shown in their respective mean percent score (18,17,13,15.6 and 22). However the mean percent score was considerably decreased in post test, which clearly shows that knowledge was changed from low to high category in the post test in all the six aspects. Further it was observed that overall mean percent score in medium category was increased from 2.6 to 32.6 and 41.6 in first and six aspects respectively.

Overall gain in knowledge of the respondents

Table-4 and fig.-1 clearly shows that the initial knowledge of the respondents was poor as their pre-test score was only 12.6 per cent. Significant improvement in the knowledge of the respondents was found as a result of exposure of training package as the pre-test score increased from 12.6 to 60.8 per cent with the gain in knowledge of about 48.2 per cent.

Table-5 indicates that there was significant difference in pre and post –test scores of respondents in all the aspects of card weaving as calculated ‘t’ value was found to be significant at 0.01 level of significance. Gain in knowledge was found highest in aspect of *Preparatory steps in card weaving* with mean percent score of 54.7 followed by aspects of *Finishing of the products* and *Process of card rotation* with mean percent score of 53.4 and 51.7 per cent respectively. In aspect of *Warp winding for larger width* and *Shed making*, there was remarkably knowledge gain as the pre test score in both these aspects was found zero which increased to 47.3 and 34.3 respectively.

Table 3. Distribution of respondents by different aspect wise knowledge and mean percent score of each category in pre-test and post-test

Different Aspects	Knowledge categories (Distribution of responses)						Knowledge categories (Mean Percent Score)						Overall % mean score		Rank		
	High (%)	Medium (%)	Low (%)	High (%)	Medium (%)	Low (%)	High (%)	Medium (%)	Low (%)	High (%)	Medium (%)	Low (%)	Pre-test	Post-test	Pre-test	Post-test	
Preparatory steps in card weaving	33.3	83.3	20	16.6	76.6	-	-	-	-	2.6	32.6	18	39.6	20.6	75.3	II	II
Pattern based threading of the holes in cards	33.3	43.3	6.66	56.6	90	-	-	-	-	8	17	55	17.3	63	III	IV	
Warp winding for larger width	-	6.6	-	86.6	-	6.6	-	-	-	3	13	46.3	-	47.3	-	V	
Shed making	-	-	-	80	-	20	-	-	-	-	-	34.3	-	34.3	-	VI	
Process of card rotation	-	56.6	10	43.3	90	-	-	-	-	16	15.6	51.3	15.6	67.3	IV	III	
Finishing of the products	10	90	10	10	80	-	-	-	2.6	41.6	22	36.3	24.6	78	I	I	

Table 4. Overall gain in knowledge of the respondents

Items	Mean % Scores	Gain in Knowledge	't'
Pre test	12.6	48.2	5.86*
Post test	60.8		

*Significant at 0.01 level of significance

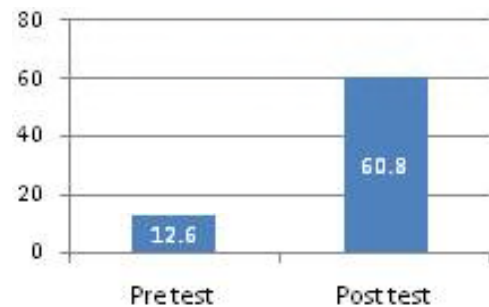
**Fig. 1. Mean percent score of overall gain in knowledge of the respondents**

Table 5. Mean percent score of pre and post test and gain in knowledge of the respondents in different aspects

Different aspects	Pre- test	Post- test	Gain in knowledge	Calculated 't' value
Preparatory steps in card weaving	20.6	75.3	54.7	3.17*
Pattern based threading of the holes in cards	17.3	63	45.7	10.66*
Warp winding for larger width	-	47.3	47.3	19.44*
Shed making	-	34.3	34.3	15.64*
Process of card rotation	15.6	67.3	51.7	16.53*
Finishing of the products	24.6	78	53.4	12.89*

*Significant at 0.01 level of significance

CONCLUSION

It can be inferred from the above tables that significant improvement in the knowledge of respondents was found as a result of exposure to training package on card weaving module as reflected through pre and post-test score data. Hence, it can be concluded that the developed training package was found very effective in improving the knowledge of the rural women. The indigenous knowledge and skill potential of rural women can be upgraded to equip them to establish and manage an enterprise.

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KNOWLEDGE AND ATTITUDE OF FARMERS REGARDING SOIL TESTING IN RAJSAMAND DISTRICT

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ABSTRACT

The study was conducted in Rajsamand district in ten adopted villages of KVK & Ten farmers randomly selected from each village that have availed soil-testing technique. The study reveals that Majority of respondents had poor knowledge & maximum knowledge gap was observed in Proper technique of sampling for fruit plants, normal crops. Study also shows positive attitude because most of adopters (78.00%) did not agree with the statement that "soil testing is wastage" of time and money & It was also observed that majority of farmers agreed (75%) with the statement "Soil testing is necessary for better crop production. The efforts should be made by KVK and Deptt. of Ag. to encourage the farmers in adoption of soil testing practices by organising training programmes and campaigns specially on soil testing process.

INTRODUCTION

Judicious application of chemical fertilizers by the farmers in crops is very much essential to achieve maximum production and to earn maximum profit. The research studies revealed that most of the farmers are using continuously larger quantities of chemical fertilizers to increase production without knowing the fertility status of the soils of their fields (Srivastava and Pandey, 1999). Soil testing is a comprehensive soil fertility evaluation programme which helps the farmer's in judicious application of chemical fertilizers to the crops. The soil testing of a particular field gives reliable information about the deficiency of major nutrients in the soil as well as hazards such as soil acidity, alkalinity and salinity etc. After testing the soil, farmers can know the exact amount of nutrients to be applied for a particular crop. The farmers will be able to know how much nutrients are already available in the soil and how much will have to be provided additionally for a particular crop. Therefore, soil testing will definitely be advantageous to the farmers in achieving maximum production and in earning max profit. So it is essential to create maximum awareness among farmers about judicious use of chemical fertilizers. Keeping in view the importance of soil testing towards optimum production of crop and maximum net profit of farmers, with the following objectives

- 1) To find out the knowledge of farmers toward

soil testing practices.

- 2) To study the attitude of farmers towards soil testing practices.

RESEARCH METHODOLOGY

The study was conducted in purposely selected district Rajsamand during 2010-2011. Ten adopted villages of KVK from the district were selected purposively. Ten farmers randomly selected from each village that have availed soil-testing technique. Thus, total numbers of farmers from ten villages were 100. The data was collected by personal interview method with the pre-tested schedule designed for the purpose.

RESULTS AND DISCUSSION

Table-1 reveals that Majority of respondents had poor knowledge but respondents had maximum knowledge regarding Benefits of soil testing, Quantity of soil for laboratory, Proper Check list of a soil sample and with 42.0 , 28.0 and 24.0 mean percent score respectively. While, maximum knowledge gap was observed in Proper technique of sampling for fruit plants, Proper technique of sampling for normal crop production and Location of soil testing laboratory having 90.0 ,85.0 and 76.0 mean percent score respective about soil testing practices

The results in Table 2 indicated that the majority

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Table 1. Knowledge of farmers about soil testing practices

S.No.	Improved practices	Extent of knowledge	Knowledge gap
		MPS	MPS
1.	Quantity of soil for laboratory	28	72
2.	Proper technique of sampling for normal crop production	20	80
3.	Proper technique of sampling for fruit plants	10	90
4.	Proper Check list of a soil sample	24	76
5.	Benefits of soil testing	42	58
6.	Location of soil testing laboratory	15	85

Table 2. Distribution of respondents according to their attitude towards soil testing practices

S. No.	Statements	Response			
		Agree	Undecided	Disagreed	Total
1	Result is given timely	48	8	44	100
2	Result of soil testing is reliable	41	12	47	100
3	Beharviour of soil testing staff is good	72	20	8	100
4	Soil testing is necessary for better crop production	75	3	22	100
5	It is very long process	65	6	29	100
6	Soil testing is wastage of time and money	20	2	78	100
7	Expenditure of crop production decreases after soil testing	40	15	45	100

of respondents were in disagreement with the statements and mostly adaptors possessed unfavourable attitude towards soil testing practices but it could also be pointed that sometimes they had showed positive attitude because most of adaptors (78.0 per cent) did not agree with the statement that “soil testing is wastage” of time and money. It was also observed that majority of farmers agreed (75%) with the statement “Soil testing is necessary for better crop production”. It means the farmers attitude was generally conservative. When the respondents were asked that “Result of soil testing is reliable” only 41 per cent adopters agreed with the statement, whereas 47 per cent adopters disagreed with it. Forty percent adopters told that Expenditure of crop production decreases after soil testing. Sixty five per cent adopters said that, “soil testing is very long process”. This means the soil testing agencies are not working properly in the area and the farmers did not show much faith on the results of soil testing and they felt that it is very long process.

CONCLUSION

The study indicated that that Majority of

respondents had poor knowledge & maximum knowledge gap was observed in Proper technique of sampling for fruit plants, normal crops. Study also shows positive attitude because most of adaptors (78.0 per cent) did not agree with the statement that “soil testing is wastage” of time and money & It was also observed that majority of farmers agreed (75%) with the statement “Soil testing is necessary for better crop production. The efforts should be made by KVK and Department of Agriculture to encourage the farmers in adoption of soil testing practices by organising training programmes and campaigns especially on soil testing process. By adopting the soil testing practices the farmers also reduced the large unnecessary chemical fertilizer consumption and the judicious use of chemical fertilizers could be popularised.

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ADOPTION OF DAIRY FARMING TECHNOLOGIES BY THE FARMERS OF NAGOUR DISTRICT OF RAJASTHAN

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ABSTRACT

The present study was conducted in Nagaur district of Rajasthan to know the adoption level of farmers regarding dairy farming technologies. In all, 180 farmers were selected randomly from three blocks of the Nagaur district. The result of the study indicated that adoption level of farmers regarding improved breeds of buffalo (45 %), dry fodder (86 %) feeding of concentrate during lactation (45%), chaffing of fodder (58 %), colostrums feeding to newly born calves (47 %), and drinking water (72%) were quite high. The adoption of dairy farming technologies was positively and significantly related with thirteen independent variables viz. age, education, family size, dairy experience, organization participation, land holding, livestock possession, annual income, economic motivation, market orientation, scientific orientation and knowledge of improved dairy management practices at 0.01 level of probability.

INTRODUCTION

Dairying is a major occupation in rural India providing substantial employment and income. It acts as a means to supplement the income of the poor households to ensure stable income. In India, government introduced several programmes to improve the status of dairy farming. Dairy farming has become a commercial enterprise now and helps farmers to improve their economic condition. India's milk output during the year 2011-12 reached the level of 127.9 million tonnes, providing per capita availability of 291 g per day. This has not only placed India at top in the world but it also represents sustained growth in the availability of milk and milk products for the burgeoning population of the country. Dairying has become an important secondary source of income for millions of rural families and has assumed the most important role in providing employment and income generating opportunities. Various established organizations, like universities, research stations, state directorates of animal husbandry and livestock extension services act at different levels in order to generate and transfer the technologies amongst livestock farmers. Despite these efforts, adoption of recommended technologies in dairy farming sector has not been as widespread as it was anticipated. While reviewing the adoption research, Loganandhan and Singh (2003) reported that adoption behaviour of farmers is influenced by their socio-economic characteristics such as

education, land holding, social participation and communication skills etc. in organic farming practices. The reason of poor adoption of dairy farming technologies amongst livestock farmers all over the world is not fully understood. Keeping this in view a study was conducted with the specific objective to study the adoption of dairy farming technologies by the farmers as well as to study the factors associated with adoption of dairy farming technologies.

RESEARCH METHODOLOGY

The study was conducted in Nagaur district of Rajasthan. Three Panchayat samities of the district namely Nagaur, Mundwa and Ladnun were purposely selected where maximum animal husbandry activities were conducted by KVK and department. From each Panchayat samities, three villages were selected randomly. A list of animal rearing farmers was prepared and from each village twenty farmers were randomly selected for study purposes. Semi structured interview schedule was used to collect the data, using personal interview method. In all, 180 respondents were finally selected for the study. The socio personal traits, socio-economic and psychological variables of livestock farmers were taken as independent variables for the study purpose.

The knowledge and adoption level of animal rearing farmers were measured. Adoption of dairy farming technologies was the dependent variable. Artificial insemination in cattle, vaccination against

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contagious disease, feeding green fodder, feeding concentrate and common dairy farming technologies were considered in the present study. To study adoption level scores obtained by each individual adopters were categorized into three groups as partly (score 1), to some extent (score 2) and fully (score 3). The summation of scores of respondents over these technologies plus score of four common dairy farming technologies was the overall adoption score of livestock owners in dairy farming technologies. Variety of statistical techniques like frequency distribution, percentage, means, standard error, t-test, product moment correlation was used to analyze the data.

RESULTS AND DISCUSSION

A. Knowledge level of animal owner farmers

The data presented in Table 1 indicated that knowledge level of farmers in case of breeding of dairy animals regarding Buffalo non- descript/ improved was found maximum (88.8%) as compare to the Artificial insemination (86.1%) for breeding of cows (83.3%), Pregnancy diagnosis (66.6%). and castration of the male animals(52.7%). In case of feeding practices drinking water and dry fodder were known by cent percent respondents followed by colostrum feeding (95.5%), use of mangers (94.4 %), chaffing of fodder (90.0%), green fodder (86.1%), feeding of concentrates during lactation (86.1%), Balance concentrate(36.1%). feeding of concentrates during pregnancy and minerals mixture (25.0%).

The knowledge of the respondents regarding health & hygiene, approximately 45% of the respondents were aware about the Cleaning/ grooming (66.6%), Cleaning of cattle shed (55.6%) and deworming (52.7%), proper time of vaccination (30.5%). The knowledge level of farmers about all the aspects included in clean milk production i.e. methods of milking, cleaning of udder and cleaning of hands & utensils were known by the 82.2, 82.2 and 83.3% respondents, respectively. Table 1 also indicates that knowledge of animal owners (Farmers) regarding Marketing practices was observed for regular selling of milk (69.4%), followed by Selling of value added products (63.8%), The overall results revealed that the farmers were found to more familiar to all animal husbandry practices (45 to 75%). Akter et. al.(2013)

observed the more or less same results.

B. Extent of adoption of animal husbandry practices by animal owner

Breeding Practices:

Table 1 indicates that 19.40 per cent of farmers had adopted crossbred cows and 44.4 per cent farmers adopted improved/superior buffalo. It was further observed that non-descript breeds of milch animals are pre-dominant in the study area.

Artificial insemination (A.I.) is best technique for the purpose of animal breeding. But practice of Artificial Insemination in dairy animals had adopted by 30.5 per cent dairy farmers. Only 25 per cent dairy farmers made pregnancy diagnosis of their animals. The castration of animal was followed by 21 percent farmer. Thus, it can be concluded that adoption of A. I. practice, rearing of crossbred and superior milch animals, and pregnancy diagnosis of their animals was poor. This might be due to unawareness of farmers about importance of improved milch animals. Artificial Insemination, animal breeding and pregnancy diagnosis of their animals in hospital, further distant location of hospitals and A.I. centres in the study area.

Feeding Practices:

Scientific feeding schedule that provides a higher plane of nutrition ensures better growth and an attainment of puberty resulting in quicker economic returns. From Table 1 it is clear that majority of farmers do not use the recommended feeding practices. Although, feeding of green fodder, dry fodder and concentrate are important inputs in milk production. Around 22 per cent of farmers fed green fodder to animals. But quality of green fodder was very poor because most of farmers collected green grasses from common property resources like forests, wastelands, common grazing land, roadside and banks of ponds. All the farmers fed required quantity of dry fodder to animals due to easy availability of dry fodder. About 26.6 per cent dairy farmers fed their animals with concentrates. Extra doses of concentrate are required for pregnant and lactating animals. But practices of extra doses of concentrate to pregnant animals were adopted only by 15.5 per cent farmer where as during lactation was 45 percent adoption in the study area.

Table 1: Knowledge and adoption of animal management practices**(n=180)**

S.No.	Particular practices	Knowledge (%)		Adoption (%)		
		Yes	No	Full	Partial	No
A Breeding						
1.	Breeding of dairy animals					
	a. Cow : cross / local	83.3	16.7	19.4	41.8	38.8
	b. Buffalo: non- descript/ improved	88.8	11.2	44.4	38.8	16.8
2.	Artificial insemination	86.1	13.9	30.5	41.6	27.9
3.	Pregnancy diagnosis	66.6	33.4	25.0	27.7	47.3
4.	Castration	52.7	47.3	21.1	45.5	33.4
	Average	75.5	24.5	28.0	39.08	32.84
B. Feeding						
1.	Balance ration					
	a. Green fodder	86.1	13.9	22.2	36.1	41.7
	b. Dry fodder	100	00.0	86.1	13.9	00.0
	c. Balance concentrate	36.1	63.9	26.6	36.1	37.3
	d. Feeding of concentrates during pregnancy	25.0	75.0	15.5	23.3	61.2
	e. Feeding of concentrates during lactation	86.1	14.9	45.5	37.6	16.9
	f. Minerals mixture/ common salt	25.0	75.0	16.6	27.7	55.7
2.	Chaffing of fodder	90.0	10.0	58.3	33.3	08.4
3.	Use of mangers	94.4	06.6	22.4	48.8	28.8
4.	Colostrums feeding to newly born calves	95.5	04.5	47.2	33.3	19.5
5.	Drinking water	100	00.0	72.2	27.8	00.0
	Average	73.8	26.3	41.2	31.79	26.95
C Health & hygiene						
1.	Cleaning/ grooming	66.6	33.4	27.7	55.5	16.8
2.	Proper time of vaccination	30.5	69.9	13.8	36.1	50.1
3.	Hygiene steps before milking	38.8	61.2	19.4	26.6	54.0
4.	Cleaning of cattle shed	55.6	44.4	30.5	41.6	27.9
5.	Deworming	52.7	47.3	33.3	22.2	44.5
6.	Isolation of sick animals	25.0	75.0	13.8	25.0	16.2
	Average	44.9	55.2	23.1	34.5	34.9
D Marketing practices						
1.	Regular selling of milk	69.4	30.6	33.3	50.0	16.9
2.	Selling of value added products	63.8	36.2	16.9	33.3	50.0
	Average	66.6	33.4	25.1	41.65	33.45

Use of mineral mixtures/ common salt improves palatability and feed intake by animals. But practice of feeding of mineral mixtures/common salt was adopted by only 16.6 per cent farmers. Chaffed fodder became palatable for animal feeding. About 58 per cent farmers feed chaffed fodder to their animals. To protect the newly born calves from diseases the Colostrums feeding is required. Colostrums feeding to the newly born calves were adopted by 47 per cent farmers. Whereas, only 22 per cent farmers feeding to the animals in manger. This might be due to lack of knowledge of importance of feeding.

Health and hygiene

Table 1 shows that less number of farmers were found to regular clean and groom (27.7 per cent), vaccinate their animals against contagious diseases (13.8 per cent), hygienic step before milking (19.4 per cent) and timely cleaning of cattle shed (30.5 per cent), deworming & dehorning of calves (33.3 percent). Thus, it can be concluded that many of farmers were not aware of practices such as and isolation of sick animals. Further, few percentage of farmers adopted “no cost” practices such as regular cleaning/ grooming, vaccination against contagious diseases, hygienic step before milking and timely cleaning of cattle shed. This might be due to lack of knowledge of farmers towards these practices. The findings of Meena, et.al.(2012) conforms the above results.

Marketing Practices

The practice of regular selling of milk and selling of value added dairy products were followed by 33.3 per cent and 16.9 per cent of farmers, respectively. The irregular selling of milk and non-existence of dairy cooperative society in the study area might be due to low production of milk at individual farmer’s level. The results are corroborated with the findings of Meena, et.al. (2012).

C. Correlation of adoption of dairy farming technology with independent variables:

With the assumption that adoption of dairy farming technology is inclined by socio-personal, economic and psychological traits, the relationship of these traits were analyzed. To assess the relationship between adoption of dairy farming technology and selected variables the coefficient of correlation was

worked out and illustrated in Table 2. The data revealed that the correlation coefficient of thirteen variables viz., Age, Education, Family size, dairy experience, organization participation, land holding, livestock possession, annual income, economic motivation, market orientation, scientific orientation and knowledge of improved dairy management practices were found to have positive and significant relationship with adoption of dairy farming technology at 0.01 level of probability. However, Material possession is positively non-significant and credit behaviour had negative and non-significant relationship with adoption of dairy farming technology at 0.01 level of probability. Similar result were observed by Patel et al. (2014)

Table 2. Relationship between Independent variables and adoption of dairy farming technology

No. Variables	r values	t values
A Socio –personal characteristics		
1. Age	0.8691	21.38**
2. Education	0.8670	9.99**
3. Family size	0.8146	8.07**
4. Dairy experience	0.5744	4.03**
5. Organization participation	0.8679	10.04**
B Socio-economic characteristics		
1. Land holding	0.6273	4.63**
2. Livestock possession	0.8741	10.34**
3. Annual income	0.8146	8.07**
4. Credit behaviour	-0.1227	-0.71NS
5. Material possession	0.2771	1.66NS
C Psychological characteristics		
1. Economic motivation	0.7801	7.16**
2. Market orientation	0.6951	5.55**
3. Scientific orientation	0.8222	8.30**
4. Knowledge of improved dairy	0.8019	7.71**
5. Management Practices	0.7292	6.12**

** Significant at 0.01 level of probability, NS – None significant

CONCLUSION

It may be concluded from the study that adoption of scientific dairy technologies such as breeding, feeding, health & hygiene, and marketing in study area was quite low to medium and unsatisfactory for development in dairy sector. The adoption of dairy farming technologies was positively and significantly related with Age, Education, Family size, dairy experience, organization participation, land holding, livestock possession, annual income, economic motivation, market orientation, scientific orientation and knowledge of improved dairy management practices at 0.01 levels significant. This could consider as the great opportunity and wide scope for scientist to know reasons behind adoption as well as for extension workers to disseminate scientific dairy practices to farmers. Therefore, scientists of KVK, Veterinary officers, Dairy Development officers must periodically conduct training and awareness programmes with respect to Vaccination/ Deworming/ Health aspect camps, feeding, breeding, health care and management etc. to boost up level of adoption of tribal farmers in the scientific dairy husbandry practices.

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LEVEL OF WORK MOTIVATION AMONG AGRICULTURE SUPERVISORS

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ABSTRACT

The present study was purposely conducted in Udaipur and Rajsamand districts of Southern Rajasthan. Udaipur district is composed of eleven panchayat samities, out of which two are non-tribal and remaining nine tribal. Similarly Rajsamand district has all seven non-tribal panchayat samities. Considering the nature of study and required sample size, all eighteen panchayat samities of identified districts were included in the sample for investigation. Thus, the number of tribal and non tribal panchayat samities were exactly the same i.e. nine tribal & nine non-tribal. Based on the information received from Department of Agriculture, Udaipur and Rajsamand, there are 321 and 134 sanctioned posts of Agriculture Supervisors respectively. Currently 148 posts in Udaipur and 90 posts of Agriculture Supervisors are filled in Rajsamand districts respectively. All Agriculture Supervisors presently working in selected districts were included in the sample. Thus the total sample was composed of 238 respondents. The findings revealed that 97 (40.46%) of the total respondents were reported in medium level of work motivation, whereas, 39 (16.39%) respondents from low level of work motivation and 102 (42.85%) respondents were found in high level of work motivation.

INRODUCTION

In most developing countries, subsistence or traditional agriculture dominates the economy. For national progress to occur, change in agriculture is essential. A great deal of responsibility for bringing about this change rests on the Ministry of Agriculture and Rural Development (MOARD), thereby on the shoulder of Agriculture Supervisors who are at the front-line of the struggle for progressive change in agriculture. Agriculture Supervisors are implementers of the government policies and strategies with the determinant role. Therefore, they are expected to hear the heart beat of the farmers in terms of agriculture and rural development. Agriculture Supervisors can effectively and efficiently discharge their responsibilities if and only if they are motivated. In order to make employees motivated and committed to their jobs in agricultural and rural development activities, there is need for strong and effective motivation at the grass root level of the sphere-head workers in the front-line who are Agriculture Supervisors (Ayeni and Popoola, 2007). Employee's motivation can only be attained by realizing that

individual needs or goals should be aligned with organizational goals or achievement. Organizations need to extract various internal and external motivators for its workers so that they can increase their motivation in order to get long run success.

RESEARCH METHODOLOGY

The study was purposely conducted in Udaipur and Rajsamand districts of Southern Rajasthan. Udaipur district is composed of eleven panchayat samities, out of which two are non-tribal and remaining nine tribal. Similarly Rajsamand district has all seven non-tribal panchayat samities. Considering the nature of study and required sample size, all eighteen panchayat samities of identified districts were included in the sample for investigation. Thus the number of tribal and non tribal panchayat samities were exactly the same i.e. nine tribal & nine non-tribal. Based on the information received from Department of Agriculture, Udaipur and Rajsamand, there are 321 and 134 sanctioned posts of Agriculture Supervisors respectively. Currently 148 posts in Udaipur and 90 posts of Agriculture Supervisors are filled in Rajsamand districts respectively. All

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Agriculture Supervisors presently working in selected districts were included in the sample. Thus the total sample was composed of 238 respondents. To measure the level of work motivation of Agriculture Supervisors, a scale developed by Castillo and Cano (2004) was used with required modifications. A sum total of eighteen major aspects were used to find out the level of work motivation. To find out the level of work motivation, overall score for each respondent was calculated and they were categorized into three groups on the basis of overall score obtained by each respondent. Mean and standard deviation was used to categorise the respondents in low, medium and high level of work motivation.

1. Low level of work motivation ($\bar{X}-S.D.$)
2. Medium level of work motivation ($\bar{X}-S.D.$ to $\bar{X}+S.D.$)
3. High level of work motivation ($\bar{X}+S.D.$)

Frequency and percentage of respondents in each category were counted.

RESULTS AND DISCUSSION

Snell (1999) says work motivation is everything. Without work motivation even the most talented people will not deliver to their potential. With work motivation, others will perform above the level expected for their intelligence and academic ability. He further asserts that it is an organization's staffs, not their managers, who ultimately have the power to boost or reduce its productivities.

The statements reflecting work motivation among Agriculture Supervisors were given weighted score to calculate work motivation measure. The score to

each statement was given based on the response of subjects. The score to individual statements was summed up to get the work motivation score. The respondents were then categorized in to three categories i.e. low, medium and high level of work motivation based on the mean and standard deviation. The results are presented in Table 1.

It is encouraging to note that the respondents in high work motivation category are relatively more i.e. 42.85 per cent and has an edge over other two categories. The respondents in medium and high motivation category together constitute more than 83 per cent of total respondents. Still there found a considerable number of Agriculture Supervisors i.e. 16.39 per cent in low work motivation category.

It must be noted that the category of Agriculture Supervisors with low work motivation might be affecting the overall productivity and performance of the organisation. The reasons why this strata is with low work motivation need to be investigated for appropriate measures.

Further it can be observed from data that the number of non-tribal work area Agriculture Supervisors in high work motivation category is much higher (51.39%) than tribal area Agriculture Supervisors (29.79%). This may be due to the difference in the working conditions and cultural difference of both areas.

The findings are in line with Ebrahim (2006), Addis (2007) who reported that the DAs were categorized into low, medium and high work motivation categories based on their deviations from the actual mean score distribution. Accordingly, those who score 11- 18, 19-28 and above 29 were categorized into low, medium and high work motivation, respectively. The results

Table 1. Distribution of respondents on the basis of level of work motivation

S.No.	Level of work motivation	Non tribal		Tribal		Total	
		f	%	f	%	f	%
1.	Low	22	15.28	17	18.09	39	16.39
2.	Medium	48	33.33	49	52.13	97	40.76
3.	High	74	51.39	28	29.79	102	42.85
	Total	144	100.00	94	100.00	238	100.00

f = Frequency, % = per cent

n=238

of this study shows that 22.7% (n=31), 57.1% (n=80), and 20.7% (n=29) of DAs were low motivated, medium motivated high motivated respectively. This is one of the evidence for low provision of extension service for farmers of the area. Therefore, it is important to identify the reasons causing this

undesirable level of work motivation.

Work motivation among Agriculture Supervisors

In order to know the level of work motivation among tribal and non-tribal area working Agriculture Supervisors, total eighteen statements were

Table 2. Work motivation among Agriculture Supervisors

No. Statement	Non tribal		Tribal		Total	
	MPS	Rank	MPS	Rank	MPS	Rank
1. The environment of the organization should be conducive for work	75.46	7	71.28	7	73.81	7
2. The Agriculture Supervisors should be satisfied with the job for using full potential for the good of organization	80.32	1	77.66	2	80.67	1
3. Working as agriculture Supervisor itself is rewarding and satisfying	72.22	11	44.26	17	72.83	8
4. Agriculture Supervisors should feel good when the assigned work is completed successfully within the stipulated time frame	70.83	15	64.89	13	69.75	15
5. Serving poor farming community is a matter of satisfaction	72.22	11	68.44	11	71.43	14
6. Agriculture Supervisors should rank the job higher than the other jobs in corporate world.	79.86	2	74.82	5	79.13	3
7. I am more happy when I give my hundred percent to my job.	71.30	14	46.81	15	71.57	13
8. I always encourage my unemployed friends to join as agriculture supervisor	64.81	18	40.85	18	64.85	18
9. I perceive the job of agriculture supervisor as noble	72.69	10	70.21	10	71.71	12
10. I perceive the job of Agriculture Supervisor as stimulating	79.63	3	79.08	1	79.41	2
11. When I am paid for the job, I am expected to work with full potential.	78.47	4	75.89	3	78.15	4
12. My persistent efforts finally convince the farmers on technological recommendations.	72.22	11	44.26	16	72.13	9
13. Reaching the organizational targets is a matter of pleasure for me.	73.15	8	70.57	9	72.13	9
14. I know working hard as agriculture supervisor will brighten my future prospects	68.98	16	68.44	11	68.77	16
15. I firmly believe that work is worship	72.69	9	70.92	8	71.99	11
16. I am constantly striving to do things better, in the organization	75.93	6	71.99	6	75.49	6
17. I always enjoy the new work and responsibilities given by my superiors in the organisation	77.31	5	75.89	3	76.75	5
18. It is the inner will that drive me to do the job assigned to me /with high precision	67.59	17	64.18	14	66.25	17

n=238

MPS = Mean Percent Score

formulated. The mean per cent score was calculated for each statement and ranked accordingly. The results have been presented in Table 2.

The data in Table 2 indicates that a fair majority of respondents (MPS 80.67) were fully satisfied with the job and using their full potential for the good of organization. Similarly, majority of subjects (MPS 79.41) have perceived the job of Agriculture Supervisor as stimulating. Nearly same numbers of respondents (MPS 79.13) have ranked their job higher than the other jobs in corporate world. It is encouraging to note that Agriculture Supervisors have a sense of responsibility (MPS 78.15), which is reflected from their response that I am paid for the job and therefore I am expected to work with full potential. This was followed by the respondents (MPS 76.75) who enjoyed the new work and responsibilities. The statement that I am constantly striving to do things better (MPS 75.49), Environment of the organization is quite conducive for work (MPS 73.81), job of the Agriculture Supervisors is rewarding and satisfying (MPS 72.83), persistent affords leading to adoption of technological recommendations (MPS 72.13) and deriving pleasure when organization targets achieved (MPS 72.13), work is worship (MPS 71.99), job of Agriculture Supervisors is noble job (MPS 71.71), giving hundred per cent to the job (MPS 71.71), serving poor farming community as a matter of satisfaction (MPS 71.43) and feeling good with time bound completion of task are some of the encouraging reflections indicating good work motivation of Agriculture Supervisors of the department of Agricultural, Government of Rajasthan.

A close observation of the data in table visualizes that there existed a little variation with respect to work motivation of Agriculture Supervisors working in non-tribal and tribal study area. With the data available at hand, it seems that the Agriculture Supervisors possess very high work motivation level and making their efforts to realize the targets of their organization. It must be mentioned here that even with such a high work motivation, if the targets of the organization are not achieved some other aspects of the organization may be looked in to including the reasons for un matching the interest of the bosses and Agriculture Supervisors. It is likely that their perception on different aspects may differ.

The findings are in line with Mallilo (1990) who suggested that motivation was dependent on a number of different factors and was subjected to change. Administrators should conduct periodic needs assessment to determine the level of motivation of personnel and identify methods for increasing motivation.

Comparison of level of work motivation among Agriculture Supervisors

Further the efforts were made to find out the difference if existed between Agriculture Supervisors working in tribal and non tribal areas with respect to work motivation. To do so, Z- test was applied and hypothesis was tested. The results are presented in Table 3.

NH_{01} : There is no difference between non-tribal and tribal area working Agriculture Supervisors regarding level of work motivation.

RH_1 : There is difference between non-tribal and tribal area working Agriculture Supervisors regarding level of work motivation.

Table 3. Significance of difference between Agriculture Supervisors of non-tribal and tribal area about level of work motivation

n=238				
No.	Category of respondents	Mean	S.D.	'Z' value
1.	Non-tribal area Agriculture Supervisors	39.77	3.72	1.899 ^{NS}
2.	Tribal area Agriculture Supervisors	39.10	3.56	

NS=Non-significant

It can be seen from Table 3 that the calculated 'Z' value was found to be less than its tabulated value. Thus, the null hypothesis (NH_{01}) was accepted and alternate hypothesis (RH_1) was rejected. It means that there was no significant difference in the level of work motivation of Agriculture Supervisors working in tribal and non-tribal areas.

This may be due to the fact that Agriculture Supervisors irrespective of their work area are governed by the similar policies, nature of job and work environment. This might have led to non significant difference in their work motivation.

CONCLUSION

The findings revealed that 97 (40.46%) of the total respondents were reported in medium level of work motivation, whereas, 39 (16.39%) respondents from low level of work motivation and 102 (42.85%) respondents were found in high level of work motivation. The study further revealed that 51.39 per cent Agriculture Supervisors of non-tribal areas were in the high level of work motivation category and 15.28 per cent Agriculture Supervisors of tribal area were in the level of work motivation, while 33.33 per cent non-tribal Agriculture Supervisors were found in the medium level of work motivation. In case of tribal Agriculture Supervisor it was observed that 18.09, 52.13 and 29.79 per cent respondents had low, medium and high level of work motivation respectively in the study sample.

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PESTICIDE USE BEHAVIOUR OF OKRA GROWERS IN NADIA DISTRICT OF WEST BENGAL

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ABSTRACT

The study was conducted in Nadia district of West Bengal. For the selection of area and respondents, multi-stage random sampling technique and universe method were followed. The study reveals that kharif season was the main season of the crop cultivation, the most harmful insect-pest of the crop was shoot and fruit borer and most harmful disease was yellow vein mosaic disease. Ladies finger growers were using various brands of various pesticides for controlling insect-pests and diseases with several doses. Infestation of insect-pests and diseases was mainly on mature stage of the crop. The respondents used 40-60 litres of water per bigha and 100-120 litres of water per bigha (1 acre=3 bigha) for spraying at seedling stage and mature stage of the crop respectively. Ladies finger growers' main source of information regarding use of pesticides was agricultural input retailers. Their interval of spraying of chemicals was mainly 4-7 days (53%) whereas the most suitable method of pesticides application was spraying (100%).

INTRODUCTION

World population has crossed the 7 billion figures and the most important challenge before the planners is the availability of adequate food for everyone. There is need to achieve sustainable increase in agricultural production. In Indian economy, agriculture retains its primary importance in terms of value creation and employment generation. There are millions of farmers tilling on small and marginal holdings where our challenge is to reach out to the last farmland and equip them with the best cultivation methods. Indiscriminate use of chemicals in agriculture during post green revolution period and their adverse effect on soil health and environment has created an alarming situation. Use of high yielding varieties and hybrids of cereals on the other hand have put a great pressure on soil and water resources. A situation has resulted which urgently demands an environmentally safe, sustainable and simultaneously, economically viable production system. This indeed is essential for optimizing production and at the same time to minimize threat to environment (Mubarak and Zargar, 2013). The lower yields are attributed to infestation of the crops by insect-pests and diseases and non-adoption of plant protection measures by farmers (Bhalekar et al.; 2013). Among the all measures to raise the productivity

level, plant protection is in central position. Plant protection is a basic exercise in any crop for control of insect-pests, diseases, weeds etc. to avoid economic losses. Reports indicate these losses ranging from 20-30 percent by each of the insect-pests, diseases and weeds, but on a holistic basis about 30 percent average cumulative loss by them appears a fair estimate. This implies that suitable control measures must be followed to keep these losses to the minimum (Muthuraman and Kumar, 2013). Among the crops, vegetable crops are the one of the major users of plant protection chemicals as observed. Farmers' use behaviour of pesticides in vegetables is so dynamic which requires regular research. So, collection of reliable information and knowledge about pesticides use behaviour of the vegetable growers becomes crucial for wide range of stakeholders. Considering the importance of the study, the objective, to portray the pesticides use pattern in ladies finger cultivation in controlling insect-pests and diseases was undertaken.

RESEARCH METHODOLOGY

The study was undertaken in the State of West Bengal. For the selection of area and respondents of the present study, multi-stage random sampling technique and universe method were adopted. At

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the first stage of sampling, Nadia district was selected among the 19 agricultural districts of the State purposely based on its' higher area coverage in vegetable cultivation. Out of 16 blocks of Nadia district, one block (i.e. Chakdah) was randomly selected at the second stage of sampling. In the selected block (Chakdah) a relatively homogenous field cultivated with vegetable crops was chosen on the basis of the opinion of the agricultural input retailers. The farmers who were growing ladies finger in that field were selected as respondents of the present study through total enumeration. Thus total 100 farmers ultimately considered as respondents of the study. The data were collected by personal interview method by using local language (Bengali) for getting their exact response and simple percentage method was used for analysis of data statistically to reach at meaningful results and conclusion.

RESULTS AND DISCUSSION

Land holding: Table 1 shows that 56 percent of respondents had 11 to 20 kathas of land for ladies finger cultivation whereas only 5 percent of them had 2.1 to 4 bighas of land under the crop cultivation. More than one-fourth of respondents (27%) had upto

10 kathas of land and remaining 12 percent of respondents had 1.1 to 2 bighas of land under this crop cultivation.

Season: Table 1 also indicates that 48 percent of respondents cultivated the crop in kharif season whereas 32 percent of them preferred to cultivate it in rabi season and only 20 percent of vegetable growers cultivated the crop in pre-kharif season. It is clear from the study that ladies finger is a round the year crop and have market demand always.

Interval of applying pesticides: Table 1 also shows that respondents preferred to apply pesticides in the following days' interval-1-3 days (20%), 4-7 days (53%), 8-15 days (17%) and more than 15 days (10%).

Experience in ladies finger cultivation: Table 2 reveals that 28 percent of respondents had 31-40 years of experience and at the lowest 10 percent of respondents had above 40 years of experience in ladies finger cultivation. The other categories are-14 percent of respondents had upto 10 years of experience, 22 percent of respondents had 11-20 years of experience and 26 percent of respondents had 21-30 years of experience in ladies finger cultivation.

Experience in applying pesticides in ladies finger

Table 1. Land holding, season and interval of applying pesticides (n=100)

Land Holding	Percent of respondents possessed	Season	Percent of respondents cultivated	Interval of applying pesticides (Days)	Percent of respondents applied
Upto 10 kathas	27	Pre-kharif	20	1-3	20
11-20 kathas	56	Kharif	48	4-7	53
1.1-2 bighas	12	Rabi	32	8-15	17
2.1-4 bighas	5			More than 15 days	10

Table 2. Experience in okra cultivation and in pesticides application (n=100)

Experience in ladies finger cultivation (Years)	Percentage of respondents (%)	Experience in pesticides application (Years)	Percentage of respondents (%)
Upto 10	14	Upto 10	40
11-20	22	11-20	29
21-30	26	21-30	16
31-40	28	31-40	15
Above 40	10	Above 40	0

cultivation: Most 40 percent of respondents had upto 10 years of experience in applying pesticides in ladies finger cultivation and at the lowest 15 percent of respondents had 31-40 years of experience in pesticides application. The other categories are- 29 percent of respondents had 11-20 years of experience and 16 percent of respondents had 21-30 years of experience in pesticides application in ladies finger cultivation. No farmers had applied pesticides above 40 years.

Insect-pests and diseases, their infestation stage and amount of water used for spraying: Insect-pests and diseases mainly infested at mature stage of the crop (Table 3). At seedling stage the amount of water used for spraying was 40-60litre/bigha of land and at mature stage of the crop, the amount of water applied by the respondents for spraying chemicals was 100-120 litre/bigha of land.

Methods of applying pesticides: All the respondents in the study area (100%) applied pesticides mainly through spraying whereas 41 percent of ladies finger growers followed dibbling method (dugged the soil and the pesticides were inserted and filled the hole by soil again especially application of granular pesticides) and only 11 percent of selected farmers also applied the chemicals by following dusting method.

Source of information in using pesticides: All the respondents (100%) reported that they mainly got information in using pesticides from agricultural input retailers at the time of purchasing pesticides. About one-third of respondents (32%) collected information from fellow farmers and it was very traditional way of getting information. In the study

area, it was seen that a crop doctor had a frequent contact with the farmers and supplied valuable information pertaining to agricultural problems. Twenty two percent of respondents replied that they got information from crop doctor whereas 18 percent of farmers collected information from neighbours (farming community) and 21 percent of respondents collected it from big farmers (opinion leaders). Only 7 percent of respondents' source of information was relatives whereas 11 percent of respondents collected that information from Agricultural Development Officers (ADOs), Krishi Prayukti Sahayaks (KPSs) when any demonstration organized by them, experts of agricultural university (when farmers came to participate any agricultural training programme or personally contacted with experts), company personnel or other agricultural fieldfunctionaries. After collecting the information from various sources, each respondent evaluated it in their level best and finally applied the suitable one.

Insect-pests: Table 4 reveals that shoot and fruit borer was one of most harmful insect-pests of ladies finger and it was reported by cent percent of respondents (100%) in the study area. Jassids, White fly, and Mite were other prominent insect-pests in the study area and it was reported by 52 percent, 43 percent and 39 percent of respondents respectively.

Shoot and fruit borer (*Earias fabia*): The larvae bore into the shoots, flower buds, flowers and fruits and cause severe shedding of the fruits or killing the plants. The chemicals used for controlling the pest, their doses and percent of respondents reported were the following: Ostaad @ 2.0ml/litre of water (29%), Metacid @ 1.0ml/litre of water (27%), Monocil @ 2.5ml/litre of water (24%), Nuvan @ 1.0ml/litre of water

Table 3. Crop stage of infestation and amount of water used for spraying (n=100)

Name of insect-pest	Crop stage of infestation	Name of disease	Crop stage of infestation	Amount of water at seedling stage	Amount of water at mature stage
Shoot and Fruit borer	Early to mature stage	Yellow vein mosaic	Mature stage	40-60 litre/bigha	100-120 litre/bigha
Jassids	Early to mature stage	Powdery mildew	Mature stage		
White fly	All the stages				
Mite	Mature stage				

Table 4. Insect-pests of okra and doses of various chemicals used to control to them (n=100)

Name of insect-pests	Percentage of respondents reported	Name of chemicals	Commercial Name	Dose (per litre of water)	Percentage of respondents applied
Shoot and fruit borer	100	Cypermethrin	Ostaad	2.0ml	29
		Methyl Parathion	Metacid	1.0ml	27
		Monocrotophos	Monocil	2.5ml	24
		Dichlorovos	Nuvan	1.0ml	22
		Cypermethrin	Cyper	2.0ml	19
		Triazophos	Hostathion	2.0ml	22
		Phosphamidon	Sumidon	1.0ml	18
		Triazophos	Tarjan	2.0ml	17
		Dimethoate	Rogor	1.5ml	16
		Chloropyriphos	Dursban	2.0ml	14
		Deltamethrin (1%) + Triazophos (35%)	Ispark	2.0ml	13
		Quinalphos	Ekalux	1.5ml	9
		Jassids	52	Cartaf Hydrochloride	Caldan
Cypermethrin	Challenger			1.5ml	21
Deltamethrin (1%) + Triazophos (35%)	Ispark			1.5ml	16
Triazophos	Hostathion			2.0ml	13
Quinalphos	Suquin			1.0ml	12
Malathion 50 EC	Malathion			1.0ml	7
White fly	43	Cypermethrin	Sherpa	1.5ml	33
		Phosphamidon	Sumidon	1.0ml	20
		Chloropyriphos	Dursban	1.5ml	20
		Imidacloprid	Confidor	1.0ml	11
		Dimethoate	Rogor	2.0ml	19
		Cypermethrin	Challenger	1.0ml	15
		Sulphur	Sulfex	2.0gm	10
		Cartaf Hydrochloride	Kritaf	2.0gm	8
Mite	39	Dicofal	Colonel-S	2.0ml	23
		Dicofal	Dicothane	2.0ml	34
		Endosulfan	Thiodan	2.0ml	21
		Ethion	Met-505	1.5ml	12
		Methomyl	Lannate	1.5gm	17

(22%), Cyper@2.0 ml/litre of water (19%), Hostathion @2.0 ml/litre of water (22%), Sumidon@1.0 ml/litre of water (18%), Tarjan@2.0ml/litre of water (17%), Rogor@1.5ml/litre of water (16%), Dursban @2.0ml/litre of water (14%), Ispark@2.0ml/litre of water (13%) and Ekalux @1.5ml/litre of water (9%),

Jassids (*Amrasca biguttula biguttula*): Both the nymphs and adults suck sap from the leaves and tender plant parts and secrete some toxic material. The pest was controlled by applying the following insecticides, their doses and percent of respondents reported were also given with it, Caldan @ 1.0gm per litre of water (29%), Challenger @ 1.5ml/litre of water (21%), Ispark @ 1.5ml/litre of water (16%), Hostathion @ 2.0ml/litre of water (13%), Suquin @ 1.0ml/litre of water (12%) and Malathion @ 1.0ml/litre of water (7%).

White fly (*Bemisia tabaci*): The adults suck the sap of the leaves and transmit the yellow vein mosaic virus. The insect-pest was controlled by applying the following insecticides, their doses and percent of respondents reported were also given with it: Sherpa@1.5ml/litre of water (33%), Sumidon@1.0ml/litre of water (20%), Dursban @ 1.5ml/litre of water (20%), Confidor @ 1.0ml/litre of water (11%), Rogor@2.0ml/litre of water (19%), Challenger@1.0ml/litre of water (15%), Sulfex@2.0gm/litre of water (10%) and Kritaf @2.0gm/litre of water (8%).

Mite (*Tetranychus cinnabarinus*): The nymphs and adults suck the sap from the leaves and other tender parts. The pesticides used by the farmers for controlling the pest, their doses and percent of respondents reported were as follows:- Colonel-S@ 2.0ml/litre of water (23%), Dicothane @ 2.0ml/litre of water (34%), Thiodan @ 2.0ml/litre of water (21%), Met-505 @ 1.5ml/litre of water (12%) and Lannate@ 1.5gm/litre of water (17%). Rawal et al. (2011) reported that pesticides namely Malathion 50EC, Endosulfan 35EC, Phorate 10G, Imidacloprid 200SL were mostly used by the okra growers for controlling various insect-pests of okra. Likewise, Bavistin, Rogor, Thiram and Malathion 50 EC were also used commonly for controlling various diseases of okra. Jakhar (2014) reported that okra crop suffers heavy losses ravages of different insect-pests, both during vegetative and fruiting stage. The important sucking

pests viz. aphid (*Aphis gossypii*), Jassids (*Amrasca biguttula biguttula*) and white fly (*Bemisia tabaci*) cause heavy economic losses by sucking cell sap from tender leaves in early stage of the crop and ultimately reduce the vigour of plant while at later stages shoot and fruit borer (*E. vitella*) larvae bore the growing shoots during early vegetative growth stage and during reproductive stage it diverts to floral buds and fruits.

Diseases: Table 5 indicates that around 70 percent of respondents reported that they had the problem due to attack of yellow mosaic disease which was generally known as "Saheb Rog" whereas 36 percent of respondents had the problem of powdery mildew disease of ladies finger.

Yellow vein mosaic disease (Yellow vein mosaic virus): This virus is transmitted by the white fly (*Bemisia tabaci*) and leaf hopper (*Empoasca devastans*). At the most 38 percent of farmers sprayed Dithane M-45 @ 2.5 g/litre of water for controlling the disease whereas other chemicals were-SAAF @2.0 g/litre of water (16%), Companion @ 2.5 g/litre of water (21%), and Bavistin @3.0 g/litre of water (9%). Most of the respondents told that the disease was a non-curable disease and finally they uprooted the plants. The information provided by them was true because yellow vein mosaic disease is a viral disease and controlling viral disease is quite difficult. Venkataravanappa et al. (2011) reported that effective management of bhindi yellow vein mosaic disease can be obtained through the application of Imidacloprid FS (5.0g/kg) and 4 spray of Imidacloprid 17.80% SL @ 0.5ml/litre with neem oil 0.03EC @ 2.0 ml/litre at 15 days interval starting from two weeks after sowing. Maurya (2015) reported that yellow vein mosaic disease is the most serious disease of okra. Removal of weeds susceptible to mosaic from nearby fields, control of white fly by uprooting and burning of affected plants from field and spray Rogor 5ml in 10 litre of water or Methyl Demeton 10ml in 10 litre of water at 7-10 days interval. Adjusting the time of sowing and cultivation of resistant varieties like Arka Anamika, Arka Abhay, Susthira etc. are recommended for raising a disease free crop.

Powdery mildew (*Erysiphe cichoracearum*): Blotches of white powdery coating are found mainly

Table 5. Diseases of okra and doses of various chemicals used to control to them (n=100)

Name of diseases	Percentage of respondents reported	Name of chemicals	Commercial Name	Dose (per litre of water)	Percentage of respondents applied
Yellow vein mosaic	70	Mancozeb	Dithane M-45	2.5gm	38
		Carbendazim (12%)+ Mancozeb (63%)	SAAF	2.0gm	16
		Carbendazim (12%)+ Mancozeb (63%)	Companion	2.5gm	21
		Carbendazim	Bavistin	3.0gm	9
Powdery mildew	36	Sulphur	Thiovit	2.0gm	35
		Carbendazim (12%)+ Mancozeb (63%)	Companion	2.0gm	18
		Mancozeb	Indofil M-45	2.5gm	16
		Carbendazim (12%)+ Mancozeb (63%)	SAAF	2.5gm	13
		Carbendazim	Bavistin	2.0gm	6
		Metalaxyl	Krilaxyl	2.5gm	4

on the lower surface of the leaves. The severely affected leaves turn yellow and drop off. The chemicals used by the respondents were –Thiovit @2.0g/litre of water(35%), Companion @2.0gm/litre of water (18%), Indofil M-45@2.5gm/litre of water (16%), SAAF @2.5gm/litre of water (13%), Bavistin @2.0gm/litre of water (6%) and Krilaxyl @2.5gm/litre of water (4%). Tandel et al. (2008) reported that more than half of okra growers (61%) had medium level of knowledge about integrated pest management whereas only 43 percent of respondents had medium level of knowledge regarding yellow vein mosaic and powdery mildew disease.

CONCLUSION

Indiscriminate use of chemicals in agriculture had brought adverse effect on soil health and environment has created an alarming situation. This indeed is essential for optimizing production and at the same time to minimize threat to environment.

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STUDY ON PREVALANCE OF UNEMPLOYMENT IN RURAL AREAS OF UDAIPUR DISTRICT

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ABSTRACT

The present study was conducted in rural area of Udaipur district of Rajasthan on a sample of 200 rural people to know their own views and suggestions for mitigating the effects of the problem of unemployment. Findings reveal that the rural people need "Labour intensive small industries in the rural areas suited to their needs and resources" and "development of their knowledge & skill both in farm sector(FS) and non-farm sector(NFS) with review of education policy" on top priority, whereas "diversification towards high value crops & value addition" and " minimum needs programmes" come last in the priority.

INTRODUCTION

India has a large population of unemployed people. The unemployment prevails in rural as well as urban area. In rural areas there are educated as well as uneducated unemployed people. As per Rangarajan Committee Report (2014) a person spending more than Rs. 32 per day in rural area is not treated as poor. It is also reported that the percentage of population below poverty line in India as in 2011-12 is 29.5. If we talk of Udaipur district there are 2,43,495 families living below poverty line out of total 5,06,847 families as per census 2011.

Unemployment is a condition in which a person capable and willing to work normally, dependent upon his earning to provide the necessities of life for himself and family, is unable to obtain a gainful employment. Since independence our governments have launched many schemes to augment employment in rural areas, the outcome has not been encouraging. The unemployment in rural India is found in its severest form. It is open as well as concealed unemployment in rural area. On an average the persons engaged in agriculture also remain unemployed for 4-6 months during a year.

The major reasons known to us for rural unemployment in India are:

(i) Excessive increase in population. (ii) Fragmented land holding and increasing pressure on land. (iii) Seasonal nature of agriculture. (iv) Lack

of subsidiary and village industries. (v) Disappearance of traditional occupations. (vi) Lack of adequate means of irrigation. (vii) Defective social system. (viii) Lack of occupational mobility. (ix) Faulty system of education. (x) Poverty (xi) Lack of employment policy and seriousness on the part of government.

In our country 66 of percent of our population is aged upto 35 years. It is stunning to note that in rural areas only 53.2 percent of the persons who were available for 12 months were able to get work for 12 months. (Labour Bureau Report, 2013-14) The present study was undertaken to find out the views and suggestions of the rural people as to how the problem of unemployment can be mitigated in the rural area.

RESEARCH METHODOLOGY

The present study was conducted in Udaipur district of Rajasthan which was selected for the reason that more than 50 percent families in rural area are below poverty line and this district has majority of SC/ST population in rural area. The district consists of 11 Tehsils, out of which two tehsils Girwa and Sarada were selected as there is mixed population of general and SC/ST categories. There are 48 Gram Panchayats in Girwa tehsil and 44 Gram Panchayats in Sarada tehsil.

Among these four Gram Panchayats from Girwa tehsil and two Gram Panchayats from sarada tehsil were selected randomly. Total of 200 families were

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Table 1. Remedial measures suggested and preferred by rural people to mitigate unemployment

S.No.	Measures suggested	Most favoured		Favoured		Least favoured		Mean score	Rank
		f	%	f	%	f	%		
1	Improvement in irrigation facilities sprinklers, drip to be made compulsory, to ensure agril. activities throughout the year.	96	48	80	40	24	12	2.36	V
2	Water resource development like Anicuts, regulation on ground water use, repairing of ponds & water reservoirs.	111	55.5	59	29.5	30	15	2.40	III
3	Legislation on conversion of Agril. Land for other purpose. A long term (25-50 yrs) planning to be adopted and beyond a reasonable radius from towns all lands should be used for agriculture.	94	47	81	40.5	25	12.5	2.24	VI
4	The actual cultivator of the land should be given a fixed incentive per acre for growing crops regularly, irrespective of the yield to take care of increased cost of cultivation and keep attached to agri. activities.	84	42	74	37	42	21	2.21	VII
5	Development of allied activities with agriculture. Rural poor finds it very difficult to get a loan from bank. Bank policy needs reforms.	104	52	66	33	30	15	2.37	IV
6	Encouraging labour intensive small industries in the villages as suited to local needs and resources.	125	62.5	49	24.5	26	13	2.49	I
7	Development of public utility structures like ponds, tanks, wells, water harvesting structures, afforestation.	70	35	72	36	58	29	2.06	XIV
8	Making the villages independent by minimum needs programmes like health care, education, PDS etc.	65	32.5	55	27.5	80	40	1.92	XX
9	Barren, rocky lands should be converted into cultivable lands.	68	34	70	35	62	31	2.03	XV
10	Creating favourable conditions for marketing of agricultural products by producer himself in the retail at all nearby towns, cities, - providing sheds in sufficient numbers.	75	37.5	80	40	45	22.5	2.15	IX

11	Controlling the growth of population, as we are producing consumers only.	82	41	72	36	46	23	2.18	VIII
12	Check on the mushrooming township developers by suitable legislations as the cultivable land is shrinking.	68	34	59	29	73	36.5	1.97	XVII
13	There is fatigue in technology. More farm research and another green revolution is needed with indigenous technology.	72	36	81	40.5	47	23.5	2.12	X
14	Dominance of Kharif crops is reducing; rainfall not restricted to monsoon season hence new cropping patterns needed.	69	34.5	61	30.5	70	35	1.99	XVI
15	More public investment needed in agriculture sector to create long-term assets and assist increase land productivity. Subsidies may be reduced.	71	35.5	80	40	49	24.5	2.11	XI
16	Housing for poor in rural area needs more emphasis alongwith other infrastructure.	68	34	56	28	76	38	1.96	XVIII
17	Provision of cheaper and timely credit instead of debt relief schemes.	72	36	73	36.5	55	27.5	2.08	XII
18	Diversification towards high value crops & value additions.	66	33	56	28	78	39	1.94	XIX
19	Govt. should effectively monitor the good schemes aimed at rural employment.	70	35	75	37.5	55	27.5	2.07	XIII
20	Knowledge and skill development to be focused in rural area both in FS and NFS. Education Policy to be reviewed.	115	57.5	55	27.5	30	15	2.42	II

selected from all the six villages for getting the suggestions & preferences. The study period was September-October, 2015.

RESULTS AND DISCUSSION

The problem of unemployment and poverty go together in the world. The same are prevailing in our country in general and particularly in rural area. The governments since independence have been making efforts to reduce unemployment through various schemes. They have not been very successful. We come to know from the study that the people in rural area have various different views on the approach

for fighting the poverty. They suggest that the approach should be area specific and as per the needs of the target group.

It is evident from the mean scores (Table 1) that the rural people “need labour intensive small industries in the villages as suited to local needs and resources” and “knowledge and skill development in FS and NFS area with improved education policy” the most with MS 2.49 and 2.42 respectively. The other unemployment fighting measure suggested and most suited to the rural people are enlisted in the table. It does not mean that the other measures are of no use but they have been ranked differently

according to the local needs and resources.

CONCLUSION

It is concluded that the rural people have been facing the problem of unemployment for many decades. They have expressed their views and suggestions for mitigation of the problem. They have suggested many possible measures in hope of a solution. Out of the measures suggested “encouraging labour intensive small industries in the villages suited to their needs and resources and “knowledge & skill development in FS & NFS with review of education policy” are the most preferred. Whereas “diversification towards high value crops & value additions “ and “making the village independent by minimum needs programmes like health care, education, public distribution system etc.” were the least preferred.

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MANAGEMENT EFFICIENCY OF MILK PRODUCERS

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ABSTRACT

The study was conducted in purposely selected two talukas-Mansa & Kalol of Gandhinagar district of Gujarat. A sample of 120 respondent was drawn from ten selected villages randomly for the study. Majority of the milk producers (65.83%) had medium management efficiency about improved dairy farming practices followed by 17.50 per cent & 16.67 per cent of milk producers had high & low management efficiency respectively.

INTRODUCTION

Agriculture is basis of village life in India. Seventy per cent of the Indian population depends on it for their livelihood. In India, keeping milk animals has been never a separate occupation from agriculture. Thus, its rural economy is closely tied up with milk animals.

India occupies the foremost position among the countries of the world in respect of livestock. It's contributing nearly about one fourth of world's total bovine population. India maintained its position as largest producers of milk, with achievement of around 121.8 million tonnes during 2010-11. (Anonymous 2011) However, there is large population of milk producing animals; the milk production is very low as compared to other countries. In our country, dairying plays crucial role in improvement of Farmers' economy. Even after several years of planning, the picture in the area of milk production is not very encouraging. There are number of factors affecting the milk production as well as dairy development. Management is one of the most important factors which help the milk producers to exploit natural resources and accumulate capital. The efficient use of resources depends to a greater extent on how milk producers acquire and adopt new innovations in the sector of animal husbandry in effective manner to reach higher levels of economic performance through their management efficiency. Therefore, the present study was undertaken to study the relationship between management efficiency and personal, sociological and psychological characteristics of milk

producers.

In Gujarat, the Gandhinagar District Co-operative Milk Producers Union Ltd., popularly known as MOTHER Dairy and its affiliated village level milk producer's co-operative societies have demonstrated their utility in the rural development. The formation of the milk co-operatives is the best way for desired development of dairy industry and organized with a view for providing effective marketing facilities for the milk produced in the villages. In a highly competitive world, the challenge before the milk producers is how well they can manage the livestock to enhance the net returns on a sustained basis. Further, the resources are very much limited in India. Therefore, efficient use of resources depends to greater extent on how they acquire and adopt innovations in the sector of animal in effective manner to reach higher level of performance i.e. management efficiency of milk producers. For this, development of every milk producer is necessary. As described in the words of Kurien- "True development is the development of the man, not of cow."

In India, extension functionaries of development departments concerned with animal husbandry are engaged in imparting technical knowledge relating to production of animal husbandry to the milk producers. In spite of their concerned efforts in this direction, the production and productivity levels have not attained to expected extent. The recent advances in dairy science technology have demonstrated that scientific management has great potential for increasing the milk production. In this

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connection Borlaug once said “Operation flood combines the power of India’s people with professional management.” Therefore, raising management efficiency is of paramount importance for milk producers. Thus it will open up new vistas and make possible for milk producers to achieve substantial gains in income. Raising the management efficiency is the fundamental problem. This problem needs to be carefully tackled for long run resolution of under developed animal husbandry.

India, the current leader in dairy world, rank 1st in the milk production levels of 121.8 million tonnes. Growth in milk production accelerated during the last three decades, coinciding with the implementation of the national dairy development programmes through producer owned cooperative structure. From the data presented in table, it can be said that India is the leading producer of milk (121.8 million tonnes) which is 17.30 per cent of the world’s milk production of 703.9 million tonnes. In India, Uttar Pradesh was having highest milk producing state including 21031000 tonnes, followed by Rajasthan (13234000 tonnes), Andhra Pradesh (11203000 tonnes), Punjab (9423000 tonnes), Gujarat (9321000 tonnes), Maharashtra (8044000 tonnes) in year 2010-2011. Per capita consumption of milk and milk products in India were about 281 gram per head per day. (Anonymous 2011)

According to animal census conducted by the statistical cell, Directorate of Animal Husbandry, Gujarat State, there was 7,975,724 numbers of cattle and 8,773,569 buffaloes in 2007. In Gandhinagar district, cattle and buffalo population were 148,468 and 364,040, respectively. (Anonymous 2007) Livestock sector had among the few growth sectors in rural India over the past five decades and its contribution to the GDP has 3.93 per cent share in 2009-10. (Anonymous 2011) In the dairy development map of India, Gujarat occupies a place of pride. This is mainly due to the impressive stride which has taken in organizing a chain of cooperative dairies in many parts of state. The unity dairy cooperative societies, veterinary colleges and state department of animal husbandry offer an opportunity where by the gain of the white revolution can flow to the producers and generate a self sustaining and processing accelerating momentum.

India has the vast resource of livestock and poultry, which play a vital role in improving socio-economic conditions of rural masses. India ranks 1st in buffalo, 2nd in cattle and goats, 3rd in sheep, 4th in duck, 5th in chickens and 6th in camel production in the world. It is matter of proud that Gujarat has highly enriched genetic resources of Cattle (Gir, Kankrej and Dangi), Buffalo (Mehsani, Jafarabadi, Surati and Banni), Sheep (Patanwadi, Marwadi and Duma) and Goat (Kachchhi, Surti, Zalawadi, Mehnsani and Gohilwadi). This situation raises the question why milk producers not yet able to reach expected level of satisfaction? To answer this, study was conducted on Management efficiency of milk producers in Gandhinagar district of Gujarat state. Hence this study was undertaken an objective to know.

1. To study the personal, socio-economic, communication and psychological characteristics of milk producers.
2. To study the management efficiency of milk producers.

RESEARCH METHODOLOGY

The present study was purposely undertaken in the two talukas *viz.*, Mansa and Kalol talukas of Gandhinagar district of Gujarat state. Five villages from each taluka were selected by random sampling method. Thus, total ten villages were selected. From each selected village, 12 farmers were selected randomly by making a sample of 120 respondents who had minimum 3 years of experience in dairy farming. The data were collected with the help of well-structured, pre-tested interview scheduled through personal contact and data were compiled, tabulated and analyzed to get proper answers for objectives of the study. A simple ranking technique was applied to measure the constraints faced by milk producers. The statistical tools used were percentage, mean score, standard deviation and coefficient of correlation value.

RESULTS AND DISCUSSION

1. Personal, socio-economic and communication characteristics of milk producers

A. Personal characteristics of the respondents

Age

The data depicted in Table 1 show that Majority

Table 1. Distribution of milk producers according to their personal characteristics**n = 120**

S. No.	Age group	f	Per cent
1.	Young (up to 35 years)	19	15.83
2.	Middle (36 to 50 years)	67	55.83
3.	Old (above 50 years)	34	28.33
S. No.	Level of education	f	Per cent
1.	Illiterate	03	02.50
2.	Primary (1 st to 7 th std.)	18	15.00
3.	Secondary (8 th to 10 th standard)	48	40.00
4.	Higher secondary (11 th to 12 th standard)	28	23.33
5.	College (above 12 th standard)	23	19.17
S. No.	Experience in dairy farming	f	Per cent
1.	Low (3 to 5 years)	26	21.67
2.	Medium (6 to 10 years)	65	54.17
3.	High (above 10 years)	29	24.17

(55.83 per cent) of the milk producers were found in the middle age group, followed by 28.33 per cent in old age group, and rest 15.83 per cent of the milk producers were in young age group.

Education

About 40.00 per cent of the milk producers had education up to secondary level of education, followed by 23.33 per cent, 19.17 per cent and 15.00 per cent of them had higher secondary, college level and primary level of education, respectively.

Experience in dairy farming

Majority (54.17 per cent) of the milk producers had medium level of experience in dairy farming, while 24.17 per cent and 21.67 per cent of them had high and low level of experience in dairy farming, respectively.

B. Socio-economic characteristics of the respondents

Size of family

Majority (68.33 per cent) of the milk producers

were having large size of family i.e. more than five members and rest 31.67 per cent of them had small size of family.

Social participation

About 40.83 per cent of the milk producers had membership in one organization followed by 23.33 per cent had no membership in any organization, 21.67 per cent had membership in more than one organization. Very few i.e. 14.17 per cent of milk producers were in holding position in various organization.

Size of land holding

About 36.67 per cent of the milk producers were in medium farmer group followed by 30.00, 19.17 and 14.17 per cent of them who had small, marginal and large size of land holding, respectively.

Annual income

Majority (59.17 per cent) of the milk producers were found with medium annual income, followed by 26.67 and 14.17 per cent with high and low annual

Table 2. Distribution of the respondents by socio economic characteristics

n = 120			
S. No.	Family size	f	Per cent
1.	Small (up to 5 members)	38	31.67
2.	Large (more than 5 members)	82	68.33
S. No.	Social participation	f	Per cent
1.	No membership	28	23.33
2.	Membership in one organization	49	40.83
3.	Membership in more than one organization	26	21.67
4.	Holding position	17	14.17
S. No.	Land holding	f	Per cent
1.	Marginal farmers (up to 1.00 ha)	23	19.17
2.	Small farmers (1.01 to 2.00 ha)	36	30.00
3.	Medium farmers (2.01 to 3.00)	44	36.67
4.	Large farmers (above 3.00 ha)	17	14.17
S. No.	Annual income	f	Per cent
1.	Low (up to Rs. 50000/-)	17	14.17
2.	Medium (Rs. 50,001 to 1,00,000/-)	71	59.17
3.	High (above Rs. 1,00,000/-)	32	26.67
S.No.	Herd size	f	Per cent
1.	Small herd size (up to 2 milk animals)	25	20.83
2.	Medium herd size (3-4 milk animals)	68	56.67
3.	Large herd size (above 4 milk animals)	27	22.50

income, respectively.

Number of milk animals

Majority (56.67 per cent) of milk producers had medium herd size, followed by 22.50 per cent of them had large herd size and 20.83 per cent had small herd size.

C. Communicational characteristics of the respondents

Extension contact

Majority (68.33 per cent) of the milk producers

had medium level of contact with different extension agencies, followed by high (20.00 per cent) and low level of (11.67 per cent) extension contact.

Mass media exposure

Majority (58.33 per cent) of milk producers had medium exposure to mass media which was followed by 25.83 per cent and 15.83 per cent had high and low exposure to mass media, respectively.

Cosmopolitanness

Majority (64.17 per cent) of milk producers had

Table 3. Distribution of the respondents by communicational characteristics

n = 120			
S.No.	Level of contact with extension agency	f	Per cent
1	Low extension contact (up to 10.56 score)	14	11.67
2	Medium extension contact (10.57 to 15.30 score)	82	68.33
3	High extension contact (above 15.30 score)	24	20.00
S.No.	Level of mass media exposure	f	Per cent
1	Low (up to 5.74 score)	19	15.83
2	Medium (5.75 to 11.96 score)	70	58.33
3	High (above 11.96 score)	31	25.83
S.No.	Level of Cosmopolitaness	f	Percent
1.	Low (up to 15.55 score)	17	14.17
2.	Medium (15.56 to 21.77 score)	77	64.17
3.	High (above 21.77 score)	26	21.67

medium level of cosmopolitaness followed by 21.67 per cent had high and 14.17 per cent had low level of cosmopolitaness.

Table 4. Distribution of milk producers according to their management efficiency

n = 120		
S. Management efficiency No.	f	%
1. Low (up to 55.02 score)	20	16.67
2. Medium (55.03 to 70.96 score)	79	65.83
3. High (above 70.96 score)	21	17.50
Total	120	100.00

Mean= 62.99, S.D. = 7.97

Management efficiency of milk producers

Majority of the milk producers (65.83 per cent) had medium management efficiency regarding improved dairy farming practices, followed by 17.50 per cent and 16.67 per cent of the milk producers had high and low management efficiency regarding improved dairy farming practices, respectively.

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UTILIZATION OF FARM SUBSIDY BY FARM WOMEN OF UDAIPUR DISTRICT

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ABSTRACT

The present study was undertaken to study the knowledge, utilization of subsidy and constraints faced by farm women in availing subsidy provided by the State Department of Agriculture, Rajasthan. The study was conducted in four villages of randomly selected Mavli panchayat samiti of Udaipur district of Rajasthan. A sample of 100 farm women was selected for the present study. Personal interview method was used for data collection. Frequency, percentage, mean percent score and paired t-test were used for analysis of the data. The major findings of the study reveal that 74 per cent farm women had knowledge and 61 per cent had availed the subsidy provided by the department.

INTRODUCTION

Agricultural development being the state subject, the major responsibility of implementing all the programmes of central and state governments goes with State Department of Agriculture. Various services are being provided to improve the quality of life of farming community by State Department of Agriculture. The State Department of Agriculture is concerned with activities relating to policy decisions on agricultural production and productivity. The directorate and field level offices in the districts and the state under the department are involved in the execution of these policies through generation and transfer of technology, ensuring availability and timely distribution of agricultural inputs.

Subsidy is one among the major service provided to farm families. State Department of Agriculture provides subsidy to farmers on various inputs like seeds, fertilizers, micro nutrients; agricultural tools and equipments; plant protection equipments; irrigation management; plant protection chemicals and bio agents; fodder tools and machines etc. so that, farmers can purchase and use these inputs at affordable prices in order to increase the agricultural production. Subsidies are among the most powerful instruments for balancing the growth rate of production and trade in various sectors and regions and for an equitable distribution of income for the protection of weaker sections of society (Kaur and Sharma, 2012).

As the government of India takes serious measure for development of agriculture sector and agriculture subsidies are one of tool to help for growth of agriculture sector in India (Salunkhe and Deshmush, 2013). Hence, it is necessary to know up to what extent the benefits of subsidy are taken by the farming community. The present paper attempts to study the knowledge, utilization of subsidy and constraints faced by farm women of Udaipur district in availing the subsidy..

RESEARCH METHODOLOGY

The study was conducted in Udaipur district of Rajasthan state. The State Department of Agriculture, Rajasthan has divided Udaipur district into three sub-districts viz. Girwa, Badgaon, and Salumber. One sub-district viz. Girwa was selected randomly from these three sub-districts for the study. From the sub district Girwa, one panchayat samiti named Mavli was selected on random basis. From selected panchayat samiti, four villages namely *Mavli*, *Nandwel*, *Gadoli* and *Thamla* were randomly selected to have representative sample of the panchayat samiti. From each village 25 farm women were selected randomly. Thus the total sample comprised of 100 farm women. Interview technique was used to collect information from the respondents. On the basis of scoring of knowledge test, three equidistance categories were made and on the basis of score obtained in knowledge test, respondents were categorized into three categories viz. poor, average

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and good. Similarly utilization score was also categorized in three equidistance category viz., low, medium and high.

RESULTS AND DISCUSSION

With regard to the subsidy of the department, Table 1 shows that majority of the respondents (74%) knew about it. They knew that 25 per cent of subsidy was provided by the department on various agricultural tools/ equipments and they were not aware about the limit of the subsidy. Main purpose of providing subsidy i.e. to help the farmers so that they can use the new technology to reduce the cost of production was known to 74 per cent of the respondents. Table further reveals that majority of the respondents (74%) knew that subsidy was provided on items like agriculture input and tools / equipment for mechanization of agriculture. Majority of the farm women (67%) revealed that subsidy on plant protection equipment was also provided by the State Department of Agriculture, Rajasthan. Further, the procedure to avail subsidy was known to less than one third of the respondents (30%).

Table 1. Knowledge of the respondents regarding subsidy

n=100	
No. Items	Percentage
1. Concept of subsidy	74
2. Purpose of subsidy	74
3. Procedure to avail subsidy	30
4. Item for subsidy	
i. Agriculture inputs	74
ii. Agriculture mechanization	74
iii. Plant protection equipment	67
iv. Irrigation management	59
5. Rate of subsidy	61

It is quite evident from the data in Table 2 that 61 per cent of respondents had availed subsidy from the department. Subsidy on quality agriculture inputs like seeds and fertilizer (DAP, Urea, SSP, Gypsum) were received by 61 per cent of the respondents. Regarding item for subsidy, 28 per cent of respondents had availed subsidy on irrigation equipments like pipeline and sprinklers; 20 per cent

of the respondents had availed subsidy on agricultural tools like sickle, ridger plough, seed drill, fertilizer seed drill and improved Bakhar and 14 per cent of them availed subsidy on plant protection equipments like sprayer, gloves, and mask. About 40 per cent of the respondents had availed subsidy more than three times followed by 17 per cent who got subsidy 1-3 times while only 10 per cent had received benefit of subsidy once. Regarding amount of subsidy received, majority of the respondents got subsidy less than rupees 5,000 while only 2 per cent obtained subsidy ranging from rupees 5,000-10,000.

Table 2. Utilization of subsidy by the respondents
n=100

No. Items	Percentage
1. Availed subsidy	61
2. Items for subsidy	
i. Agricultural inputs	61
ii. Plant protection equipment	14
iii. Irrigation	28
iv. Agricultural tools/ equipments and machines	20
3. Frequency of utilization	
i. Once	10
ii. 1-3 times	17
iii. More than 3 times	34
4. Amount of subsidy (in Rupees)	
i. Less than 5,000	59
ii. 5,000 – 10,000	02
iii. More than 10,000	0

Significant difference was found among the responded regarding knowledge and utilization of subsidy, which may be due to limited target fixed for subsidy by department and various constraints faced by the respondents in utilization of subsidy.

It could be observed from data in Table 3 that majority of respondent reported that even after getting subsidy they have to pay a good amount to purchase the item, this was the major constraint hindering the utilization of subsidy by farm women followed by constraint not having any bank account to avail subsidy encountered with MPS 39. While

Table 3. Distribution of the respondents by constraints faced in utilization of subsidy

n=100

S. No.	Constraints	Extent			MPS
		To great extent (%)	To some extent (%)	Not at all (%)	
1.	High cost even after subsidy	12	62	26	43
2.	Not having bank account for availing benefit of subsidy	39	0	61	39
3.	Lack of awareness	20	16	64	27
4.	Long processing time	11	27	62	24.5
5.	Delay in getting response from agriculture supervisor	0	13	87	6.5

lack of awareness, long processing time in getting subsidy and delay in getting response from agriculture supervisor about subsidy were also found as constraints in making the significant use of the service.

CONCLUSION

It can be inferred that majority of respondent had knowledge about the subsidy provided by the State Department of Agriculture, Rajasthan while more than half of the farm women have utilized the subsidy. Farm women had good level of knowledge about subsidy items. Utilization of service was found low among the farm women. Significant difference was found among the knowledge and utilization of subsidy by farm women due to target based subsidy and other constraints. As more than one third of farm women had never availed subsidy so there is an

urgent need to create awareness among farm women so that they can take advantage of subsidy to fullest.

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CONSTRAINTS PERCEIVED BY STAKEHOLDERS ABOUT ANIMAL HEALTH DELIVERY SERVICES IN TONK DISTRICT OF RAJASTHAN

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ABSTRACT

The present study was conducted in Tonk district of Rajasthan in order to ascertain the constraints perceived by different stakeholders of animal health delivery services. A total of 120 livestock farmers and 60 personnel of state department of animal husbandry were selected as respondents from 8 selected villages of 4 tehsils of the district while secondary data were collected from annual reports and other occasional reports of SDAH. Most important constraints identified by livestock farmers in using livestock services were the absence of efficient diagnostic laboratories with sufficient infrastructure in rural areas at the veterinary institutes followed by lack of insurance facilities, credit facilities, extension facilities, inadequate budget allotment, inadequate veterinary staff, more distance of veterinary dispensaries. On the other hand, major constraints faced by SDAH personnel in delivering livestock services to livestock farmers were the absence of efficient diagnostic laboratories with sufficient infrastructure in the veterinary dispensaries in rural areas at the veterinary institutes followed by inadequate veterinary staff, large area of coverage, inadequate budget allotment, lack of clear cut promotion criteria in the service, lack of adequate availability of equipments, unrealistic physical targets in livestock service delivery.

INTRODUCTION

Livestock is an integral part of India's agricultural economy and plays a multifaceted role in providing livelihood support to the rural population. Livestock sector apart from contributing to national economy in general and agricultural economy in particular, also provides employment generation opportunities, asset creation, coping mechanism against crop failure and social & financial security. Livestock is the main source of animal protein for the human population. It is estimated that about 70 million rural households own livestock of one species or the other. Our rural women constitute about 69% of workforce engaged in livestock sector. The resource poor small and marginal farmers and landless labourers own majority of the livestock resources. Hence, sustainable development of the livestock sector would lead to more inclusive development and empowerment of women. (GOI, National livestock policy, 2013). The importance of livestock sector owes to growing

consumption of livestock product because, the demand for and production of livestock products is expected to double over the next 20 years in the developing countries like India, which is now in the midst of "livestock revolution" (Delgado *et al.*, 1999).

The delivery of livestock services is emerging as an important concern due to increasing demand for livestock and its products for enhancing and optimizing livestock production and management. The productive potential of animals depends crucially on the prevalent animal health delivery system, besides other areas where unfortunately India has a poor record (Ahuja *et al.* 2008). However, poor health of livestock, with consequent high mortality and high costs of veterinary services represent significant constraints to livestock keeping (Fuller, 2003). Among various services, an effective and efficient animal health care service delivery system is of paramount importance in India. The plethora of studies (Shweta, 2014; Ahuja *et al.*, 2008) has indicated State

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Department of Animal Husbandry and Veterinary Services as the main and primary provider of veterinary services apart from other private agencies, Dairy cooperatives and Non-governmental organizations which function at the regional level.

The policy priorities and directions for service delivery often get determined by the biases and beliefs of the decision maker. While those trained in veterinary science argue that it is poor animal health which is the main constraint to livestock production, the nutritionist point to the poor availability of feeds and fodder, the breeders to poor genetics (Ahuja and Redmond, 2001). A whole range of services including veterinary health, advisory on production, credit, market information and market access needs to be operational for quality services and inputs.

Livestock production potential is not realized fully because of constraints related to feeding, breeding, healthcare and management. Deficiency of feed and fodder accounts for half of the total loss, followed by the problems of breeding and reproduction (21%) and diseases (18%). Frequent outbreaks of diseases like FMD, BQ, PPR, Brucellosis, Swine fever and Avian Influenza etc. continue to reduce productivity and production. However, the available veterinary support in terms of infrastructure (for hospitals and diagnostic labs), technical manpower, is insufficient.

Keeping this in view, an earnest effort was made to study the perceived constraints of farmers and personnel of state department of Animal Husbandry in livestock service delivery in Rajasthan.

RESEARCH METHODOLOGY

The present study was carried out in Rajasthan state followed an ex-post facto and exploratory research designs. Multistage random sampling was adopted for this study. The study was conducted in the state of Rajasthan as it is one of the important agricultural states in the country with high livestock population. Tonk district was selected randomly out of 33 districts for the study. A total of four tehsils in Tonk district were selected randomly. A total of 8 villages at the rate of two from each of the selected tehsils were selected randomly. The respondents of the study comprised veterinarians of SDAH, Para veterinarians of SDAH and livestock farmers. Out of

all the selected tehsils, a total of 120 livestock farmers i.e. 15 livestock farmers from each of the village were selected for the study. On the other hand, a total of 60 SDAH personnel i.e. 15 from each of the selected tehsils were selected. Data were collected personally from respondents with the help of structured interview schedule developed for the study. A pretested closed structured interview schedule was used for the farmers while, a different closed interview schedule was used for the veterinary staff.

Prior to data collection both interview schedules were modified in the light of suggestions offered by experts. The data after collection were coded, tabulated, classified and further categorized for systematic statistical analysis. The descriptive statistical tools i.e. mean, SD, frequency, percentage and correlation coefficient were used for data analysis. The results were interpreted accordingly.

RESULTS AND DISCUSSION

A) Constraints perceived by livestock farmers in utilization of SDAH livestock services

The data indicate that majority of livestock farmers (95 %) identified absence of efficient diagnostic laboratories in rural areas as the major problem in utilization of SDAH livestock services followed by lack of insurance facilities for the animals (89.16 %), lack of providing information on newly developed livestock production technologies (74.16 %), inadequate budget allotment for the provision of veterinary services (71.66 %), inadequate veterinary staff and large area of coverage (40 %), more distance of veterinary dispensaries from the villages (26.66 %), lack of skills on part of veterinarians in treating the particular cases of animal (20 %), lack of facilities for conducting post mortem in village (14.16 %), lack of facilities for conducting A.I. in villages (11.66 %), insufficient supply of vaccines to the hospitals (9.16 %), lack of accountability among veterinarians for providing the services (7.50 %), non-availability of the round the clock services (4.10%), lack of sufficient supply of drugs at the veterinary hospitals (3.33%).

A perusal of data in table 1 show that lack of efficient diagnostic laboratories in rural areas and lack of insurance facilities for the animals are the most severe constraints perceived by the livestock

owners. This may be due to the problems encountered by them in getting their animals diagnosed and fear of losing costly animals. The results were partly in conformity with that of Ravikumar *et al.* (2005) who reported that absence of efficient diagnostic laboratories in rural areas, lack of sufficient supply of drugs at the veterinary hospitals, inadequate budget allotment for the provision of veterinary services, on-availability of round the clock services and lack of sufficient infrastructure facilities for treating the surgical cases as the major problems perceived by livestock farmers in utilization of veterinary services. Rajput (2006) also identified the problems like inadequate availability of medicines at veterinary hospital and poor accessibility of timely veterinary services as the major perceived problems of livestock farmers. Hence, the government authorities should make earnest efforts to solve these constraints so as to make livestock service delivery effective. The other problems like inefficiency and lack of skills on part of SDAH personnel could be mitigated by conducting

regular training programmes, which deal with handling surgical and critical cases of animals.

B) Constraints perceived by SDAH personnel in livestock service delivery to livestock owners:

The results in the Table 2 reveal the problems of SDAH personnel in provision of livestock services. Among all the problems, absence of efficient diagnostic laboratories with sufficient infrastructure in the veterinary dispensaries (96.66%) was ranked first by the SDAH Personnel. The other problems identified by them were inadequate veterinary staff and larger area coverage (94.44%), lack of clear cut promotion criteria in the service (92.22%), poor payment and incentives from the government (90.00%), lack of sufficient infrastructure facilities for providing the clinical services (88.33%), inadequate budget allotment for the provision of veterinary services (85.00%), absence of in-service training opportunities for updating knowledge and skills (82.00%), lack of adequate availability of equipments at veterinary institutions (77.77%), lack of sufficient

Table 1. Constraints perceived by livestock farmers in utilization of SDAH livestock services

S.No.	Constraints	Yes		No		Rank
		f	%	f	%	
1.	Absence of efficient diagnostic laboratories in rural areas	114	95.00	06	5.00	I
2.	Lack of insurance facilities for the animals	107	89.16	13	10.83	II
3.	Lack of providing information on newly developed livestock production technologies	89	74.16	31	25.83	III
4.	Inadequate budget allotment for the provision of veterinary services	86	71.66	34	28.33	IV
5.	Inadequate veterinary staff and larger area coverage	48	40.00	72	60.00	V
6.	More distance of veterinary dispensaries from the villages	32	26.66	88	73.33	VI
7.	Lack of skills on part of veterinarians in treating the particular cases of animal	24	20.00	96	80.00	VII
8.	lack of facilities for conducting post mortem in village	17	14.16	103	85.83	VIII
9.	Lack of facilities for conducting A.I. in villages	14	11.66	106	88.33	IX
10.	Insufficient supply of vaccines to the hospitals	11	9.16	109	90.83	X
11.	Lack of accountability among veterinarians for providing the services	09	7.50	111	92.25	XI
12.	Non-availability of the round the clock services	05	4.10	115	95.83	XII
13.	Lack of sufficient supply of drugs at the veterinary hospitals	04	3.33	116	96.66	XIII
14.	Discrimination by the veterinary staff in attending the cases	0	00.00	120	100	XIV

infrastructure facilities for extension purpose (73.88%), unrealistic physical targets in livestock service delivery (65.55%), overburdening with the administrative duties like maintenance of records etc. (61.11%), low mobility in rural areas due to inadequate availability of vehicles for transport (43.88%), inadequate coordination with other agencies which are delivering the livestock services (35.55%), lack of cooperation from superior as well as sub ordinate staff (25.55%), lack of adequate training for providing the livestock services (18.33%), Lack of sufficient time in extending the services (17.77%), lack of sufficient supply of drugs and vaccines at the veterinary hospitals (11.11%).

The study indicated that the most important problem faced by the SDAH personnel in livestock service delivery was absence of efficient diagnostic laboratories with sufficient infrastructure in the veterinary dispensaries. The results were in accordance with that of Rajput (2006) who observed

similar findings like lack of infrastructural facilities and adequate equipment's as the major perceived problems of veterinary officers. Majority of the respondents identified the lack of coordination within the department and with the other agencies as least ranked problems, which is a good symptom indicating healthy organizational climate in SDAH. Sasidhar *et al.* (2001) who observed that the inadequate supply of medicines by the department, lack of knowledge and skills of advanced surgical techniques and treatments, lack of guidance by superiors and non-cooperation from farmers as the main constraints in livestock service delivery. Ravikumar (2005) reported that the lack of transport facilities as the major problem in providing effective livestock services. Other problems related to infrastructural facilities, drug and input supply to the veterinary institutions and shortage of staff were mainly because of the inadequate budget allotment by the SDAH for livestock services.

Table 2. Constraints perceived by SDAH personnel in livestock service delivery to livestock owners

S.No.	Constraints	Percentage	Rank
1.	Absence of efficient diagnostic laboratories with sufficient infrastructure in the veterinary dispensaries	96.66	I
2.	In adequate veterinary staff and larger area coverage	94.44	II
3.	Lack of clear cut promotion criteria in the service	92.22	III
4.	Poor pay and incentives from the government	90.00	IV
5.	Lack of sufficient infrastructure facilities for providing the clinical services	88.33	V
6.	Inadequate budget allotment for the provision of veterinary services	85.00	VI
7.	Absence of In-service training opportunities for updating knowledge and skills	82.00	VII
8.	Lack of adequate availability of equipment in the veterinary institutions	77.77	VIII
9.	Lack of sufficient infrastructure facilities for extension purpose	73.88	IX
10.	Unrealistic physical targets in livestock service delivery	65.55	X
11.	Overburdening with the administrative duties like maintenance of records etc.	61.11	XI
12.	Low mobility in rural areas due to inadequate availability of vehicles for transport	43.88	XII
13.	Inadequate coordination with other agencies which are delivering the livestock services	35.55	XIII
14.	Lack of cooperation from superior as well as sub ordinate staff	25.55	XIV
15.	Lack of adequate training for providing the livestock services	18.33	XV
16.	Lack of sufficient time in extending the services	17.77	XVI
17.	Lack of sufficient supply of drugs and vaccines at the veterinary hospitals	11.11	XVII

Table 3. Suggestion provided by livestock keepers to improve the livestock service delivery system

S.No.	Suggestion	Rank
1.	Establishment of new veterinary institutions in the remote areas with advance diagnostic facilities	I
2.	Provision of credit facilities and insurance facilities for new and existing livestock units	II
3.	Information on newly developed livestock production technologies	III
4.	Budget allotment for the provision of veterinary services	IV
5.	Adequate veterinary staff	V
6.	Subsidized inputs supply i.e. Medicines, vaccines, artificial insemination through camps	VI
7.	Organizing camps in pre and post monsoon periods	VII
8.	Training and technical guidance on livestock farming	VIII
9.	Post-mortem facility	IX
10.	Adequate extension & communication facility advise on marketing facility and government schemes	X
11.	Regular provision of prize and awards for best maintained animals	XI

Suggestions put forward by livestock owners to improve Livestock service delivery system:

The livestock owners were also asked to elicit suggestions to improve the services of the veterinary department for its better utilization by them in the remote areas. On the basis of perceived intensity and frequency, all the listed suggestions were given ranks in the Table No. 3 which revealed that majority of the respondents suggested arrangements for regular service through setting the new veterinary institutions in the remote areas with advance diagnostic facilities might improve service delivery as first major suggestion followed by provision of credit facilities and insurance facilities for new and existing livestock units as second suggestion, provision for providing information on newly developed livestock production technologies as third suggestion. The results also revealed that adequate budget allotment for the provision of veterinary services and adequate veterinary staff and subsidized inputs supply i.e. medicines, vaccines, artificial insemination through camps emerged as a fourth and fifth overwhelming

Suggestion respectively in the pooled sample. Organizing camps in pre and post monsoon periods, adequate advisory, training and technical guidance

on livestock farming, post-mortem facility, marketing facility and government schemes, arrangements for communication facilities in veterinary dispensaries to get timely services and extension contact, regular provision of prize and awards for best maintained animals in calf rallies and livestock shows and adequate extension activities were the other suggestions elicited by the livestock owners in descending order irrespective of the locale.

CONCLUSION

It can be concluded that absence of efficient diagnostic laboratories with sufficient infrastructre in rural areas at the veterinary institutes, lake of insurance facilities were important constraints perceived by the livestock farmers in using the livestock services in the study area.

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ASSOCIATION BETWEEN PERSONAL TRAITS AND CONSTRAINTS IN MARKETING OF MILK

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ABSTRACT

The National Commission on Agriculture observed that, next to agriculture, dairying is the most important subsidiary occupation. Dairy farming along with crop husbandry as mixed farming provides continue income and full employment to all the members of a family as dairying is labour intensive. Dairy development has been acclaimed as an effective instrument capable of bringing about speedy economic and social transformation of the weaker sections of the rural community. The study indicated that the major constraints perceived by milk producers was lack of regulated market and milk cooperatives followed by low price of liquid milk, delay in payment by unorganized sector and lack of infrastructure in marketing of milk. It was found that age, education, occupation, size of land holding, annual income, family size, social participation and extension contact were not significantly associated with constraints in marketing of milk perceived by the milk producers.

INTRODUCTION

Milk production in India is predominantly the domain of small dairy farmers in mixed farming system. Indian dairying has made rapid strides but animal productivity remained low. The average dairying assumes great significance in providing employment to rural people as well as stable source of income to augment their earning from main enterprise they follow like crop husbandry. Dairy enterprise plays very important role in the rural economy of India. It provides income and employment not only to the workers, unemployed people of the society but also to the farming community of the country. The returns from small holding can be maximized by the proper combination of dairy enterprise with crop production. India ranks first in milk production, achieving an annual output of 146.3 million tonnes during 2014-15 as compared to 137.69 million tonnes during 2013-14 recording a growth of 6.26 per cent. Whereas, the Food and Agriculture Organization (FAO) has reported a 3.10 per cent increase in world's milk production from 765 million tonnes in 2013 to 789 million tonnes in 2014 (Economic survey 2015-16).

RESEARCH METHODOLOGY

The present investigation was conducted purposely in Rajasthan state. Rajasthan is India's largest state by area. It is located on the western side

of the country. The present study was conducted in Udaipur district of Southern Rajasthan. Girwa and Salumbar were selected for the present study on the basis of maximum livestock population to draw the sample of village for inclusion in the study. A complete list of all the major milk producing villages of the selected tehsils was prepared in consultation with the personnel of revenue department, patwari, officials of dairy union etc. From the prepared list, five villages from each tehsil were selected on the basis of maximum number of milk producers. Thus, ten villages were selected for the present investigation. Out of the prepared list, 12 farmers were selected from each village on the basis of random sampling technique. Thus, total 120 farmers were selected for investigation.

RESULT AND DISCUSSION

Constraints as perceived by the milk producers in marketing of milk

The constraints perceived by the milk producers in marketing were identified and same have been presented in Table 1. To get an overview of constraint level in marketing of milk, the respondents were divided into three groups viz., low level constraint (<27.12), medium level constraint, (27.12 to 42.24) and high level constraint (> 42.24). The groups were formulated on the basis of calculated mean and standard deviation of the constraints scores obtained

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Table 1. Distribution of respondents according to their constraints perceived by the milk producers in marketing of milk

		n=120					
S.No.	Constraint Level	Girwa tehsil		Salumbar tehsil		Total	
		f	%	f	%	f	%
1.	Low (<27.12)	17	28.33	8	13.33	25	20.83
2.	Medium (27.12 to 42.24)	36	60.00	28	46.67	64	53.34
3.	High (>42.24)	7	11.67	24	40.00	31	25.83
Total		60	100	60	100	120	100

f= frequency, % = per cent

by the respondents. The results are presented in the Table 1.

The data in Table 1 reveals that out of 120 respondents, majority of respondents (53.34%) fell in medium level constraint group whereas, 25.83 per cent milk producers were observed in the high level constraint group and remaining 20.83 per cent respondents possessed low level of constraint about marketing of milk.

Aspect-wise constraints perceived by the milk producers in marketing of milk

It is evident from the data incorporated in Table 2 that lack of regulated market and milk cooperatives was the most severe constraint encountered by majority of the milk producers with 90.27 MPS and was ranked first by milk producers. Besides, low price of milk was severe constraint perceived by the milk producers with 86.38 MPS and was ranked second by milk producers. The next most important problem faced by milk producers was delay in payment by unorganized sector with 78.88 MPS and was ranked third by the milk producers. Lack of infrastructure in marketing of milk was another serious constraint with 76.11 MPS and was ranked fourth by the milk producers followed by lack of time for marketing with 72.77 MPS and was ranked fifth by the milk producers.

Table 2 further shows that low risk taking behavior with 70.27 MPS was also serious constraint and was ranked sixth by the milk producers. Whereas, the other constraint in descending order of its magnitude was related to lack of transport facilities with 70.00 MPS and was ranked seventh by the milk producers. Another problem which was faced by the milk

producers was vast area of marketing with 69.72 MPS and was ranked eighth by the milk producers. Table further shows that constraint like lack of road network in the area was assigned ninth rank with 68.61 MPS by the milk producers followed by constraint like irregular sell of milk with 68.33 MPS and was ranked 10th by the milk producers. The next important problem faced by the milk producers was lack of marketing information with 67.77 MPS and was ranked 11th by the milk producers.

Table 2 further depicts that constraint like less knowledge about marketing strategies at local level was assigned 12th rank with 66.94 MPS by the milk producers followed by constraint about distantly located collection centre with 63.88 MPS and was ranked 13th by the milk producers. Further, the constraints about lack of adequate staff for marketing and irresponsible and irregular transporter were considered less important constraints by the milk producers in marketing of milk with 65.00 MPS and 64.16 MPS and were ranked 14th and 15th, respectively. Analysis of data indicates that constraint about inability to market for value-added products with 63.88 MPS was faced as least severe constraints and was assigned last rank by the milk producers.

Associations of selected personal traits with constraints in marketing of milk by the milk producers

Association between age of the respondents and constraints in marketing of milk:

An observation of data shows that out of total 20 respondents from young age group, 5 (25.00%)

Table 2. Aspect-wise constraints perceived by the milk producers in marketing of milk

n=120			
S.No.	Constraints	MPS	Rank
1	Lack of road network in the area	68.61	IX
2	Low price of milk	86.38	II
3	Lack of infrastructure	76.11	IV
4	Lack of marketing information	67.77	XI
5	Lack of regulated market and milk cooperatives	90.27	I
6	Delay in payment by unorganized sector	78.88	III
7	Irregular sell of milk	68.33	X
8	Lack of time for marketing	72.77	V
9	Low risk taking behavior	70.27	VI
10	Lack of adequate staff for marketing	65.00	XIV
11	Vast area of marketing	69.72	VIII
12	Distantly located collection center	66.38	XIII
13	Lack of transport facilities	70.00	VII
14	Less knowledge about marketing strategies	66.94	XII
15	Difficulty in marketing of value-added products	63.88	XVI
16	Irresponsible and irregular transporter	64.16	XV
Average		72.25	

MPS = Mean per cent score

had viewed in category of high level of constraints, while 10 (50.00%) and 5 (25.00%) milk producers were found in the group of medium and low level of constraints in marketing of milk, respectively. In the middle age group, 44 (57.14%), 19 (24.68%) and 14 (18.18%) milk producers were found in medium, high and low category of constraints in marketing of milk, respectively. In case of old age group, out of 23 respondents, 26.08 per cent, 43.48 per cent and 30.44 per cent milk producers had low, medium and high

constraints in marketing of milk. The calculated chi-square value was 1.64 which is less than tabulated value, therefore there was no association between as of respondents and constraints in marketing of milk.

Association between education of respondents and constraints in marketing of milk

The results in Table 4 indicates that out of total 56 respondents in upto primary group, 57.14 per cent,

Table 3. Association between age of the respondents and constraints in marketing of milk

n=120					
Age category	Level of constraints			Total	χ ² value
	Low	Medium	High		
Low (< 31years)	5 (25.00) ¹ (20.00) ²	10 (50.00)(15.62)	5 (25.00)(16.13)	20 (100)(16.67)	1.64^{NS}
Medium (31-54 years)	14 (18.18)(56.00)	44 (57.14)(68.76)	19 (24.68)(61.30)	77 (100)(64.17)	
High (> 54 years)	6 (26.08)(24.00)	10 (43.48)(15.92)	7 (30.44)(22.57)	23 (100)(19.16)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS- Non Significant

Table 4. Association between education of respondents and constraints in marketing of milk

Education level	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	Illiterate	8 (24.24) ¹ (32.00) ²	16 (48.48)(25.00)		
Up to primary	10 (17.86)(40.00)	32 (57.14)(50.00)	14 (25.00)(45.16)	56 (100)(46.66)	
Above primary	7 (22.58)(28.00)	16 (51.62)(25.00)	8 (25.80)(25.80)	31 (100)(25.84)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS- Non Significant

25.00 per cent and 17.86 per cent had medium, high and low category of constraints in marketing of milk, respectively. In the group of illiterate, out of 33 respondents, 48.48 per cent, 27.28 per cent and 24.24 per cent respondents were in medium, high and low category of constraints in marketing of milk, respectively. Out of 31 respondents in above primary group, 7 respondents (22.58%) were in low, 16 respondents (51.62%) were in medium and 8 (25.80%) respondents were in high constraints category. Table further shows that there was no association between education and constraints faced by the respondents in marketing of milk.

Association between occupation and constraints in marketing of milk

An observation of data in Table 5 shows that out of total 27 milk producers from labour group, 7 (25.92%) were viewed in category of high level of constraints, while 13 (48.16%) and 7 (25.92%) milk producers were found in the group of medium and low level of constraints in marketing of milk, respectively. In the agriculture group, 41 (56.17%),

19 (26.03%) and 13 (17.80%) milk producers possessed medium, high and low constraints, respectively in marketing of milk. In case of business and service group, out of 20 respondents, 25.00 per cent, 50.00 per cent and 25.00 per cent milk producers were in low, medium and high category of constraints in marketing of milk, respectively. The calculated chi-square value indicates that there was no association between occupation and constraint in marketing of milk.

Association between annual income of respondents and constraints in marketing of milk

The data accorded in Table 6 shows that out of 30 respondents, 14 (46.66%) respondents of Rs. 10, 000 to 1.0 lac annual income group were viewed in medium category of constraints in marketing of milk. Whereas, out of 70 milk producers from Rs. 1.0 lac to 2.5 lac annual income group, 12 (17.15%), 40 (57.15%) and 18 (25.70%) were in low, medium and high category of constraints in marketing of milk, respectively. In case of above Rs. 2.5 lac annual income group, out of 20 respondents, 5 (25.00%), 10

Table 5. Association between occupation of respondents and constraints in marketing of milk

Occupation level	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	Labour	7 (25.92) ¹ (28.00) ²	13 (48.16)(22.58)		
Agriculture	13 (17.80)(52.00)	41 (56.17)(64.06)	19 (26.03)(61.30)	73 (100)(60.83)	
Business and service	5 (25.00)(20.00)	10 (50.00)(13.36)	5 (25.00)(16.12)	20 (100)(16.67)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1= Percentage of row, 2= Percentage of column, NS= Non-significant

Table 6. Association between annual income of respondents and constraints in marketing of milk

Income level	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	Rs. 10,000 to 1.0 lac per annum	8 (26.67) ¹ (32.00) ²	14 (46.66)(21.88)		
Rs. 1.0 lac to 2.5 lac per annum	12 (17.15)(48.00)	40 (57.15)(62.50)	18 (25.70)(58.07)	70 (100)(58.33)	
Above Rs. 2.5 lac per annum	5 (25.00)(20.00)	10 (50.00)(15.62)	5 (25.00)(16.13)	20 (100)(16.67)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS= Non-significant

(50.00%) and 5 (25.00%) milk producers were observed in low, medium and high category of constraints in marketing of milk, respectively. It was also noted that there was no association between annual income of respondents and constraint in marketing of milk.

Association between size of land holding of respondents and constraints in marketing of milk

The data recorded in Table 7 show that out of 36

landless milk producers, 25.00 per cent, 47.22 per cent and 27.78 per cent were in low, medium and high category, respectively. Whereas, out of 65 milk producers who had less than 1 ha land, 11 (16.92%), 38 (58.46%) and 16 (24.62%) were in low, medium and high category of constraints in marketing of milk, respectively. In case of more than 1 ha land group, out of 19 respondents, 5 (26.32%), 9 (47.36%) and 5 (26.32%) had low, medium and high constraints, respectively. The calculated chi-square value between

Table 7. Association between size of land holding of respondents and constraints in marketing of milk

Land holding	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	Landless	9 (25.00) ¹ (36.00) ²	17 (47.22)(26.56)		
Less than 1 ha land	11 (16.92)(44.00)	38 (58.46)(59.37)	16 (24.62)(51.62)	65 (100)(54.17)	
More than 1 ha land	5 (26.32)(20.00)	9 (47.36)(14.07)	5 (26.32)(16.12)	19 (100)(15.83)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS= Non-significant

Table 8. Association between family size and constraints in marketing of milk

Family size	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	Nuclear	10 (26.32) ¹ (40.00) ²	18 (47.36)(28.12)		
Joint	15 (18.29)(60.00)	46 (56.10)(71.88)	21 (25.61)(67.74)	82 (100)(68.33)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS= Non significant

size of land holding and constraint in marketing of milk was 1.84, which was not significant association between them.

Association between family size of respondents and constraints in marketing of milk

The results in Table 8 indicates that out of total 38 respondents in nuclear family group, 26.32 per cent, 47.36 per cent and 26.32 per cent were in low, medium and high category of constraints in marketing of milk, respectively. In joint family group, out of 82 respondents, 56.10 per cent, 25.61 per cent and 18.29 per cent respondents were in medium, high and low category of constraints in marketing of milk, respectively. There was no association between family size of respondents and constraint in marketing of milk.

Association between social participation and constraints in marketing of milk

The data recorded in Table 9 shows that out of 29 milk producers who had not participated in any

organizations, 24.13 per cent, 48.28 per cent and 27.59 per cent were in low, medium and high category, respectively, whereas, out of 44 milk producers who were member of organization, 8 (18.18%), 23 (52.72%) and 13 (29.10%) respondents were in low, medium and high category of constraints in marketing of milk, respectively. In case of member of local committees, out of 47 respondents, 10 (21.28%), 27 (57.44%) and 10 (21.28%) were in the category of low, medium and high constraints in marketing of milk, respectively. The calculated chi-square value indicates that there was no association between social participation and constraint in marketing of milk.

Association between extension contact of respondents and constraints in marketing of milk

The data recorded in Table 10 shows that out of 28 milk producers who regularly contacted with extension agencies, 7 (25.00%), 14 (50.00%) and 7 (25.00%) had low, medium and high level of constraints in marketing of milk, respectively. In the occasionally contacted with extension agencies

Table 9. Association between social participation and constraints in marketing of milk

Social participation	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	No participation	7 (24.13) ¹ (28.00) ²	14 (48.28)(21.82)		
Member of organization	8 (18.18)(32.00)	23 (52.72)(35.94)	13 (29.10)(41.94)	44 (100)(36.67)	
Member of local committees	10 (21.28)(40.00)	27 (57.44)(42.24)	10 (21.28)(32.26)	47 (100)(39.16)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS= Non significant

Table 10. Association between extension contact of respondents and constraints in marketing of milk

Contact with extension agencies	Level of constraints			Total	χ^2 value
	Low	Medium	High		
	Regularly	7 (25.00) ¹ (28.00) ²	14 (50.00)(21.88)		
Occasionally	8 (14.82)(32.00)	32 (59.26)(50.00)	14 (25.92)(45.16)	54 (100)(45.00)	
Never	10 (26.32)(40.00)	18 (47.36)(28.12)	10 (26.32)(32.26)	47 (100)(39.67)	
Total	25 (20.83)(100)	64 (53.33)(100)	31 (25.84)(100)	120 (100)	

1 = Percentage of row, 2 = Percentage of column, NS= Non-significant

group, out of 54 respondents 8 (14.82%), 32 (59.26%) and 14 (25.92%) possessed low, medium and high level of constraints in marketing of milk, respectively. In case of never contacted with extension agencies group, out of 47 respondents 26.32 per cent, 47.36 per cent and 32.26 per cent possessed low, medium and high level of constraints in marketing of milk, respectively. Table further indicates that there was no association between association contact and constraint in marketing of milk.

CONCLUSION

It was found that majority of respondents fell in medium level of constraint group whereas, 25.83 per cent milk producers were observed in the high level constraint group and remaining 20.83 per cent respondents possessed low level of constraint about marketing of milk. The study further indicated that the major constraints perceived by milk producers was lack of regulated market and milk cooperatives followed by low price of liquid milk, delay in payment by unorganized sector and lack of infrastructure in marketing of milk. Further, the constraints about lack of adequate staff for marketing, irresponsible and irregular transporter and inability to market for value-added products were considered less important constraints as perceived by milk producers in marketing of milk. It was also found that age, education, occupation, size of land holding, annual income, family size, social participation and extension

contact were not significantly associated with constraints in marketing of milk by the milk producers.

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STUDY ON BREEDING MANAGEMENT PRACTICES FOR DAIRY CATTLE AND BUFFALO IN UDAIPUR DISTRICT OF SOUTHERN RAJASTHAN

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ABSTRACT

A study was conducted in Udaipur district of Southern Rajasthan. Four hundred and eighty farmers from 16 villages of 4 tehsil were selected by multistage random methods for study. Majority of farmers (46.25%) belonged to middle age (30 to 45 years), 39.58% were illiterate and medium size (40.0%) family with 4 to 6 family members. Respondents with marginal land holding was less than 2.0 hectare land and small herd size (4 animals) were maximum (39.58%) in the district. Maximum farmers (21.25%) district citrus in cow and buffalo by observing mucous discharge along with maintaining other animals and with bellowing. Adoption of artificial insemination in cattle and buffalo was 27.08% percentages. Majority of the farmers (39.58%) preferred to serve their animals within 8-9 hours after heat detection either through private bull or artificial insemination by AI (27.08% & AI). Adoption of practices like pregnancy diagnosis and record keeping for breeding were medium (29.17% and 33.33%). Majority of the farmers (63%) were conscious to breed their cows and buffaloes within 5 months after calving for maintaining optimum calving interval and maximum production performance.

INTRODUCTION

India has emerged as leading milk producer country with 146 million tons milk (Indian Dairyman, 2016) but the productivity of dairy animals is still very low. Udaipur district is located as the southern edge of Rajasthan having largest numbers of milch animals in the state. Majority of the farmers preferred cattle and buffalo and major contributor and provides the largest share of milk to dairy co-operative union. Breeding practices have much influence on milk production and ultimately the economy of the dairy farmers. Keeping this in view, present study was planned to delineate the information on the dairy animals breeding management practices followed by farmers of Udaipur district of Southern Rajasthan.

RESEARCH METHODOLOGY

The present study was conducted in Udaipur district of southern Rajasthan. There are total eleven tehsils in Udaipur district, out of which four tehsils were randomly selected for the study *viz.*, Gogunda, Mavli, Sarada and Vallabhnagar. Four villages were selected from each selected tehsil and in each village 30 respondents who reared local cattle and buffaloes were selected by using a three stages (selection of

tehsil, villages and respondents) random sampling technique. The pre designed interview schedule developed for study was used for collecting the information. The study being of an exploratory nature, the qualitative data were quantified accordingly and tabulated. Chi-square test (Test of independence) was being applied to determine the association of animal management practices with different categories (Sukhatme and Amble, 1978).

RESULTS AND DISCUSSION

Cattle is the prime choice of animal reared alone (37.50%) with indigenous cows and buffaloes (14.58%) or crossbreed cows (14.17%) in Udaipur district. The characteristic of cross section of respondents given in Table 2. The highest percentage of the dairy cows and buffaloes owners (46.25%) belonged to middle age (30 to 45 years age) category followed by young (30.0%) and old (23.75%) age categories in Udaipur district. Looking to the level of education, majority of them were either illiterates (39.58%) or having primary (28.08%) education, with medium (5-8 members) or large family size (more than 8 members). Majority of respondents had poor land resources and were either marginal (49.58%) or large size (27.08%) farmers. Similar finding also observed

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by Gami *et al.* (2013). Proportion of respondents with small (1-4 animals) and medium (4-6 animals) size herd were 39.58 and 29.17 per cent in the Udaipur district (Table 2).

Table 1. Sample respondents

Selected tehsil	Selected villages	No. of respondents	Total
1. Gogunda	(i) Bhutala	30	120
	(ii) Jambuwa	30	
	(iii) Kantharya	30	
	(iv) Madhra	30	
2. Sarada	(i) Balwa	30	120
	(ii) Nal	30	
	(iii) Pal	30	
	(iv) Sadkali	30	
3. Mavli	(i) Ashna	30	120
	(ii) Gudli	30	
	(iii) Kham ki madhuri	30	
	(iv) Virdolya	30	
4. Vallabh Nagar	(i) Bhaghtal	30	120
	(ii) Bhopulpura	30	
	(iii) Rupahali	30	
	(iv) Vallabh Nagar	30	

The breeding practices followed by the cattle and buffalo owners of Udaipur district given in Table 3. Cows were the only animal of preference in Udaipur district as two-third of the respondents kept cows as sole dairy animals. One-third of the respondent profound to keep buffaloes along with crossbreed cows. The results in line to earlier workers (Yadav *et al.*, 2013, Gami *et al.*, 2013 and Soni, 2005) observed same trend of preference of dairy animals. It was found that 16.04, 15.00, 21.25, 14.38, 21.04 and 12.29 per cent respondents detected estrus in cow and buffalo by observing estrus symptoms like bellowing, mucous discharge, mounting on other animals. Mucous

discharge + bellowing, off feed and restless respectively. This findings was comparable with findings of Patel *et al.* (2005), Gami *et al.* (2013) who observed that majority of respondents of detected heat in their animals by bellowing mucous discharge and mounting on other's animals. It was found that 51.67% farmers preferred natural survive and 27.08% farmers preferred AI (Artificial insemination). Data showed that 18.55% respondents allowed survive to bovine within 8 to 9 hours, between 10-12 hours (39.58%) after heat detection and 33.33% between 12-16 hours. Trend for pregnancy diagnosis and record keeping was observed in 29.17% and 33.33% of the respondents respectively. Very few (12.92%) respondents kept their own breeding trevies. Data revealed that 37.71%, 25.62% and 36.67 per cent respondents followed breeding of their dairy animals after 2-3 months, 3-5 months and after 5 months of calving respectively. These observations are in accordance with the finding of Gami *et al.* (2013) adopted by majority of farmers in Banaskantha district, Gujarat.

CONCLUSION

It may be concluded from the present study that cows are the choice of dairy animals for the farmers of Udaipur district. Majority of the cows keeps were small and marginal farmers and landless labours in Udaipur district. Farmers of the Udaipur have better awareness about breeding practices in the cows and buffaloes. Bellowing, mucous discharge and restless were the signs utilized for heat detection in dairy animals. Though the adoption of natural survive by bull was more as compared to AI. Adoption of pregnancy diagnosis and record keeping was medium in the district. Majority of the farmers breed their animals with in 5 months of gain maximum benefits.

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Table 2. Characteristics of cross-section of respondents

Different parameters	Category	Total (n=480)	Percentage
Age	Young age - Below 30 years	144	30.0
	Middle age - 30 to 45 years	222	46.25
	Old age - Above 45 years	114	23.75
Level of education	Illiterate	190	39.58
	Primary	130	27.08
	Secondary	118	24.58
	Undergraduate	42	8.75
Family size	Small (upto 5 members)	122	25.42
	Medium (upto 5-8 members)	192	40.00
	Large (more than 8 members)	166	34.58
Land holding size	Small - less than 2 hectare	112	23.34
	Medium - 2.4 hectare	238	49.58
	Large - more than 4 hectare	130	27.08
Herd size	Small - less than 4 animals	190	39.58
	Medium - 4-6 animals	140	29.17
	Large - 6-8 animals	102	21.25
	Very large - more than 8 animals	48	10.00

Table 3. Breeding practices followed by the dairy respondents

Different parameters	Category	Total (n=480)	Percentage
Species of milk animals	Cow	180	37.50
	Buffalo	162	33.75
	Indigenous cattle + buffalo	70	14.58
	Crossbreed cattle + buffalo	68	14.17
Heat detection symptoms	Bellowing	77	16.04
	Mucous discharge	72	15.00
	Mounting on other animals	102	21.25
	Mucous discharge + bellowing	69	14.38
	Off feed	101	21.04
	Restless	59	12.29
Service of buffaloes and cows	Natural	248	51.67
	AI	130	27.08
	Natural / AI	102	21.25
Service provided after heat detection	Within 8-9 hours	89	18.55
	Between 10-12 hours	190	39.58
	Between 12-16 hours	160	33.33
	Within 24 hours	41	8.54
Pregnancy diagnosis	Yes	140	29.17
Practice followed	No	340	70.83
Record keeping	Yes	160	33.33
Keeping of breeding trevis	Yes	320	66.67
Breeding of cows and buffaloes after calving	2-3 months	181	37.71
	3-5 months	123	25.62
	After 5 months	176	36.67

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KNOWLEDGE AND ADOPTION OF IMPROVED CULTIVATION PRACTICES OF GROUNDNUT BY THE FARMERS OF BIKANER DISTRICT OF RAJASTHAN

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ABSTRACT

The present study was conducted in Bikaner district of Rajasthan. From Bikaner district, two tehsils namely Sri Dungargarh and Nokha were selected purposely on the basis of highest area of groundnut and five villages from each respective tehsil were selected on the basis of simple random sampling technique 10 per cent groundnut growers were selected randomly from of each selected village. In this way 120 groundnut growers were selected for the present investigation. Majority of the respondents (54.60%) were having medium knowledge level whereas, 22.07 per cent farmers were having low knowledge level and rest 23.33 per cent farmers were having high knowledge level about improved cultivation practices of groundnut. Majority of (59.17 per cent) of farmers were found to be in medium adoption category, while 23.33 per cent farmers were found in low adoption category and only 17.50 per cent of farmers were in high adoption category.

INTRODUCTION

Groundnut oil is the major edible oil account for 45 percent of total edible oil produced in the country followed by mustard oil (27 percent), cotton seed oil (10 percent), coconut oil (7 percent), and seasmum oil (5 percent). India accounted for 39.25 percent of the total area and 41.04 percent of the total production of groundnut in the world in the year 1997-98. In India during the 2011-12 the total area under groundnut is 4.19 million hectare with 5.62 million ton production with 1341 kg/ha average yield.

Introduction of new agricultural technology has resulted in a progressive transformation from traditional agriculture to modern agriculture. Many high yielding varieties of groundnut along with the full package of practices have been introduced in different agro-climatic zones of Rajasthan but the adoption rate of the improved practices by farmers is very slow and there for groundnut production has not been increased to significant extend. Hence the present study was undertaken to assess the knowledge level & adoption is farmers about production technology of Groundnut.

MATERIAL AND METHODS

The present study was conducted in Bikaner district of Rajasthan. The Bikaner district comprises of 8 tehsils. Out of them, Sri Dungargarh and Nokha tehsils were selected purposely on the basis of highest area of groundnut in comparison to other tehsils in the district. Five villages were selected from each identified tehsil by simple random sampling technique. 10 per cent groundnut growers were selected randomly from of each selected village. In this way 120 groundnut growers were selected for the present investigation. The data were collected by personal interview method. Data so collected were classified, tabulated and statistically analyzed which led to the following salient findings.

RESULTS AND DISCUSSION

Knowledge level of farmers

Knowledge is the cognitive behaviour of an individual, which plays an important role in covert as well as overt behaviour of an individual. Knowledge was measured with the help of knowledge test developed for the purpose. The knowledge score for each farmer was calculated and the respondents were

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grouped into three categories viz., low, medium and high.

The results in Table 1 reveal that majority of the respondents (54.60% of groundnut growers) were having medium knowledge level whereas, 22.07 per cent farmers were having low knowledge level and rest 23.33 per cent farmers were having high knowledge level about improved cultivation practices of groundnut.

Table 1. Distribution of farmers under different knowledge levels about improved cultivation practices of groundnut

n= 120			
No.	Categories of knowledge level	No. of farmers	% of farmers
1	Low knowledge (score below 25.02)	27	22.07
2	Medium knowledge (score from 25.02 to 43.46)	73	54.60
3	High knowledge (score above 43.46)	20	23.33
Total		120	100

$\chi = 34.24$ score, $\sigma = 9.22$ score

Practice wise extend of knowledge

From Table 2 it is evident that the farmers were having highest knowledge (80.28 MPS) about “Soil and field preparation” and hence this practice was ranked first. The second highest MPS (77.50 MPS) was having about “Sowing of seed” which was ranked second followed by “High yielding varieties” (74.17 MPS) and “Harvesting” (72.50 MPS) which were ranked third and fourth respectively.

The knowledge aspects like “Fertilizers application”, “Storage”, Seed treatment”, “weed management” were moderately known by the farmers as 70.73 MPS, 68.33 MPS, 62.17 MPS, 54.29 MPS respectively and ranked assigned fifth, sixth, seventh and eighth respectively followed by “Plant protection measures” (51.06 MPS) and “Spacing” (38.96 MPS) which were ranked ninth and tenth respectively.

Extent of adoption

Table 3 shows that majority of (59.17 per cent) of farmers were found to be in medium adoption

Table 2. Farmers knowledge about improved cultivation practices of groundnut

n=120			
No.	Package of practices	MPS	Rank
1.	Soil and field preparation	80.28	I
2.	High yielding varieties	74.17	III
3.	Seed treatment	62.17	VII
4.	Sowing of seed	77.50	II
5.	Spacing	38.96	X
6.	Fertilizers application	70.73	V
7.	Weed management	54.29	VIII
8.	Plant protection measures	51.06	IX
9.	Harvesting	72.50	IV
10.	Storage	68.33	VI

category, while 23.33 per cent farmers were found in low adoption category and only 17.50 per cent of farmers were in high adoption category.

Table 3. Distribution of farmers under different categories of adoption regard to improves cultivation practices of groundnut

n = 120			
No.	Categories of adoption level	No. of farmers	% of farmers
1.	Low adoption (Score below 24.41)	28	23.33
2.	Medium adoption (Score from 24.41 to 39.47)	71	59.17
3.	High adoption (Score above 39.47)	21	17.50
Total		120	

$\chi = 31.94$ score, $\sigma = 7.53$ score

Practice wise adoption level

Out of ten selected practices, the extent of adoption of “Soil and field preparation” was having 78.21 MPS which were higher than the other improved practices of groundnut. The adoption of “Harvesting” (73.89 MPS) and “High yielding varieties” (71.55 MPS) recorded second and third position respectively after adoption of the “Soil and

field preparation”.

The extent of adoption of practices like “Fertilizer application” and “Sowing of seed” were upto the extent of 70.09 MPS and 68.27 MPS, respectively and these were ranked fourth and fifth respectively. While the extent of adoption about practices like “Storage”, “Seed treatment”, “Plant protection measures”, “Weed management” and “Spacing” were 53.67, 49.37, 36.50, 35.00, and 23.08 MPS, respectively were ranked sixth, seventh, eighth, ninth and tenth respectively.

Table 4. Extent of adoption of improved cultivation practices of groundnut by the farmers

n = 120			
No.	Package of practices	MPS	Rank
1.	Soil and field preparation	78.21	I
2.	High yielding varieties	71.55	III
3.	Seed treatment	49.37	VII
4.	Sowing of seed	68.27	V
5.	Spacing	23.08	X
6.	Fertilizer application	70.09	IV
7.	Weed management	35.00	IX
8.	Plant protection measures	36.50	VIII
9.	Harvesting	73.89	II
10.	Storage	53.67	VI

CONCLUSION

Majority of the farmers had medium knowledge level about the improved cultivation practices of groundnut. Among the various aspects of different improved cultivation practices of groundnut, all the

farmers had high knowledge about “Soil and field preparation” and “Sowing of seed” whereas the farmers had least knowledge about “Spacing” and “Plant protection measures”. More than half of the respondents were having medium adoption about improved cultivation practices of groundnut. The practice like “Soil and field preparation” and “Harvesting” were over adopted by the groundnut growers. The practices like “Spacing” and “Weed management” were the least adopted practices of the farmers.

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OPINION OF FARMERS TOWARDS USE OF CHEMICAL FERTILIZERS IN COTTON CULTIVATION

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ABSTRACT

The present study was conducted in Rajsamand district of Rajasthan. Two tehsil namely Railmagra and Rajsamand were selected for the study. Total 120 cotton growers (40 marginal, 40 small and 40 large farmers) were randomly selected from the identified tehsils. Data were collected by personal interview technique from selected respondents. The study revealed that 49.17 per cent cotton growers possessed moderately favourable opinion whereas, 26.67 and 24.17 per cent respondents possessed most favourable and least favourable opinion towards use of fertilizers in cotton crop respectively. The study further shows that the statements namely "the use of fertilizer is one of the important ways of increasing income through cotton", "the use of chemical fertilizer is less profitable in relation to the cost involved" and "use of fertilizer requires complete understanding for successful cultivation of cotton" are viewed by the majority of cotton growers. Further observed that there was no significant difference among marginal, small and large farmers in use of recommended fertilizers in cotton crop.

INTRODUCTION

The major cotton growing countries are USSR, USA, China, India, Brazil, Pakistan, Turkey, Mexico and Sudan, which account for nearly 85.00 per cent of the total world's production. India ranks first in the area under cotton cultivation in the world and stands fourth in terms of production. In India, the total area under cotton crop is 12.18 million hectares with 34.09 million bales production with 476 kg/ha average yield (Anonymous, 2011). Rajasthan covers about 5.30 lakh hectares with 17.10 lakh bales production with 548 kg/ha average yield (Anonymous, 2011). In Rajasthan cotton is mainly cultivated in Sriganganagar, Hanumangarh, Bikaner, Jodhpur, Bhilwara, Nagaur, Sirohi, Pali, Chittorgarh, Rajsamand and Ajmer. It has been observed that the use behaviour of fertilizers among farmers is uneven and sometimes there is great gulf between convictions of farmers about the fertilizer use in fields. The utilization of fertilizers depends on the positive opinion of farmers and their socio-economical, psychological and technical factors. With this background in view, the present study was undertaken "to know the opinion of farmers towards use of fertilizer in cotton crop."

RESEARCH METHODOLOGY

The present study was conducted in the purposely selected Rajsamand district of Rajasthan. There are total 7 tehsils in Rajsamand district of Rajasthan, out of which Rajsamand and Railmagra tehsils were selected on the basis of maximum area under cultivation of cotton. Further, a comprehensive list of all the major cotton growing villages was prepared in consultation with the personnel of Revenue and Agriculture Department from the identified tehsils. Eight villages from selected tehsils were taken on the basis of maximum area under cotton cultivation. Thus, total eight villages were selected for the present investigation. For selection of respondents, a comprehensive list of cotton growers was prepared with the help of village Patwari and agricultural supervisor of respective village. The list so prepared 5 marginal, 5 small and 5 large farmers were selected randomly from each identified village. Thus, in all 120 farmers (40 marginal, 40 small and large farmers) were included in the sample of the study. Data were collected from selected respondents by employing personal interview technique. Thereafter, data were analysed, tabulated and results

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were interpreted.

RESULTS AND DISCUSSION

Table 1 reveals that out of 120 respondents, majority of respondents (49.17%) possessed moderately favourable opinion whereas, 26.67 per cent cotton growers were observed in most favourable opinion group and remaining 24.17 per cent respondents possessed least favourable opinion towards use of fertilizers in cotton crop. Analysis of table further reveals that 30.00 per cent large farmers, 27.50 per cent small farmers and 22.50 per cent marginal farmers possessed most favourable opinion towards use of fertilizers in cotton cultivation. Whereas, 52.50, 47.50 and 47.50 per cent large, small and marginal farmers were in the group of moderately favourable opinion respectively. It was also found that 7, 10 and 12 respondents from the category of large, small and marginal farmers respectively had least favourable opinion about use of various fertilizers in cultivation of cotton.

From the above discussion, it could be concluded that majority of cotton growers had positive opinion about use of fertilizer in cotton. It was further concluded that most of the farmers possessed either moderately or high level of opinion towards use of fertilizers in cotton cultivation. The results of the study are in line with the findings of Meena (2003).

For knowing the opinion of farmers towards use of fertilizers in cotton crop, in all 18 statements were considered. Mean percent score for each statement was calculated and ranked accordingly. The Data

accorded in Table 2 reveal that majority of the farmers were strongly agreed with the fact that “the use of fertilizers is one of the important ways of increasing farm income through cotton” with MPS 93.50 and was ranked first by the respondents. This was followed by negative statement like “the use of chemical fertilizer is less profitable in relation to the cost involved” with MPS 90.50 and ranked second by the cotton growers. The third important statement namely “use of fertilizers requires complete understanding of the cause and effect relationship for successful cultivation of cotton”, which was positively viewed by the farmers with the extent of 90.00 per cent.

Table further shows that cotton growers had strongly favoured with the statement entitled “the use of chemical fertilizer is easiest way to increase crop yield” with MPS 89.83, whereas, the majority of the respondents were disagreed with the statement “the agriculture supervisor working in our area is competent enough to educate about its scientific application in cotton crop” with 88.67 mean percent score. It means that agriculture supervisor of the study area possessed poor knowledge about various fertilizers and its application in cotton cultivation. Table also reveals that the statement namely “injurious use of chemical fertilizers decreases soil fertility and nutrients imbalance” was positively viewed by the majority of cotton growers with MPS 88.50 and assigned rank sixth in the rank order of opinion statements.

Further analysis of table 2 clearly shows that cotton growers also disagreed with the negative

Table 1. Distribution of respondents on the basis of their level of opinion towards use of fertilizers in cotton

		n=120							
S. No.	Opinion group	Marginal farmers		Small farmers		Large farmers		Total	
		f	%	f	%	f	%	f	%
1.	Most favourable	9	22.50	11	27.50	12	30.00	32	26.67
2.	Moderately favourable	19	47.50	19	47.50	21	52.50	59	49.17
3.	Least favourable	12	30.00	10	25.00	7	17.50	29	24.17
Total		40	100.00	40	100.00	40	100.00	120	100.00

f = Frequency % = Per cent

statements namely, “there is more propaganda about utility of fertilizers but in purchase not so”, “training of farmers will not increase the efficiency of fertilizers application in cotton”, “the fertilized crop is become more susceptible to disease and insect pest”, “it is useful because their effects are confined to their crops to which they are applied” and “the yield of cotton crop is very much increase only by the use of chemical fertilizers” with the extent of 87.33, 87.17, 87.10, 85.67, 84.33 and 84.00 per cent respectively. These aspects were placed on seventh, eighth, ninth, eleventh, twelfth and fourteen position in the ranking hierarchy by the cotton growers respectively.

It was noted that most of the respondents were

agreed with the positive statements like “if no adequate FYM is available the use of chemical fertilizer is essential” and “the use of chemical fertilizers improves the quality of fibre which fetch more price in market” which were ranked tenth and thirteenth with the mean per cent score 85.50 and 84.17 respectively.

Further analysis of table clearly shows that cotton growers also agreed with positive statements namely “it is good to use chemical fertilizers as compared to FYM they act more quickly,” “chemical fertilizers are most appropriate source of nutrient application in cotton crop” and “the use of chemical fertilizers demand more capital investment” which were ranked

Table 2. Extent of opinion of farmers towards use of fertilizers in cotton cultivation

n = 120

S. No.	Statements	Marginal farmers		Small farmers		Large farmers		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1.	Chemical fertilizers are most appropriate source of nutrient application in cotton crop	78.50	17	84.00	13	83.50	14	82.00	16
2.	The use of chemical fertilizers are less profitable in relation to the cost involved	92.00	3	89.50	6	90.00	2	90.50	2
3.	The use of chemical fertilizers is easiest way to increase the crop yield	86.50	8	94.50	1	88.50	4	89.83	4
4.	The fertilized crop become more susceptible to diseases and insect pests	79.00	16	90.50	4	87.50	7	85.67	11
5.	The use of chemical fertilizers improves the quality of fibre which fetch more price in market	84.50	13	82.50	14	85.50	11	84.17	13
6.	It is useful because their effects are confined to their crop to which they are applied	85.00	11	80.00	16	88.00	6	84.33	12
7.	Injudicious use of chemical fertilizers decreases soil fertility and nutrient imbalance	87.50	6	94.00	2	84.00	13	88.50	6
8.	The agriculture supervisor working in our area is competent enough to educate about its scientific application in cotton crop	88.50	4	90.00	5	87.50	8	88.67	5

Conti.....

9.	Use of fertilizers requires complete understanding for successful cultivation of cotton	93.50	2	88.50	9	88.00	5	90.00	3
10.	There is more propaganda about the utility of fertilizers but in practice it is not so	86.00	9	89.00	7	87.00	9	87.33	7
11.	The use of fertilizers is one of the important ways of increasing income through cotton	94.00	1	94.00	3	92.50	1	93.50	1
12.	Training of farmers will not increase the efficiency of fertilizers application in cotton	85.00	12	87.10	10	89.00	3	87.17	8
13.	It is good to use chemical fertilizers become as compared to FYM, they act more quickly	84.00	14	80.50	15	82.50	16	82.33	15
14.	Only big and resource rich farmers can use the chemical fertilizers in cotton crop	87.50	7	88.50	8	85.50	10	87.17	9
15.	If no adequate FYM is available the use of chemical fertilizer is essential	88.00	5	84.50	12	84.50	12	85.67	10
16.	The yield of cotton crop is very much increase only by the use of chemical fertilizers	84.50	10	85.50	11	82.50	15	84.17	14
17.	The use of chemical fertilizers demand more capital investment	82.00	15	78.50	17	76.00	17	78.83	17
18.	The use of recommended dose of chemical fertilizers makes the soil poor	76.00	18	69.00	18	68.50	18	71.17	18

MPS = mean per cent score

fifteen, sixteen and seventeen respectively. The mean per cent score of these statements was 82.33, 82.00 and 78.83 respectively. In other hand the statement “the use of recommended dose of chemical fertilizers makes the soil poor” was considered as least favourable and placed at last position in the opinion hierarchy by the cotton growers

Thus, from the above discussion, it may be concluded that cotton growers showed favourable opinion towards use of fertilizers in cotton cultivation. Majority of the respondents were interested for judicious use of chemical fertilizers on the basis of soil testing for cotton cultivation. The present findings are in line with the findings of Rawal (2011), who found that 42.50 per cent of total respondents had moderately favourable opinion, while 19.16 and

38.34 per cent respondents possessed least favourable and high favourable opinion towards use of pesticides in okra respectively. She further indicated that statements namely, training of farmers will increase efficiency of pesticide application, timely use of pesticide for plant protection is profitable venture and injudicious use of pesticides develops resistance in large number of pests were positively viewed by the large number of respondents.

Comparison of opinion among marginal, small and large farmers about use of fertilizers in cotton crop:

Analysis of variance test was applied to see the significant difference in level of opinion possessed by the different categories of respondents. The result of ANOVA computed for this purpose has been

Table 3. Comparison in the opinion of the different categories of farmers about use of fertilizers in cotton crop

n = 120				
Source of variation	d.f.	S.S.	M.S.S.	F. Value
Between the categories of farmers	2	20.150	10.075	1.26408 ^{NS}
Error	117	932.517	7.9702	
Total	119	952.667		

NS = Non significant

presented in Table 3.

Data presented in Table 3 reveal that the calculated 'F' value (1.26408) is lower than tabulated 'F' value at 1 per cent level of significance at 2 degree of freedom. Thus, the null-hypothesis entitled "there is no significant difference among the different categories of farmers regarding opinion towards use of fertilizers in cotton crop" was accepted. It means that there was no significant difference in all the three categories of farmers with respect to use of fertilizers in cotton crop. Thus, it was concluded that the opinion was more or less same in marginal, small and large farmers with respect to use of fertilizers in cotton crop.

CONCLUSION

It was found that 49.17 per cent of total respondents had moderately favourable opinion, while 26.67 and 24.17 per cent respondents possessed most favourable and least favourable opinion towards use of fertilizers in cotton respectively. The study also indicated that majority of the respondents

possessed positive opinion towards use of fertilizer in cotton crop. They were also interested for judicious use of chemical fertilizers on the basis of soil testing for cotton cultivation.

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PRICE SPREAD ANALYSIS OF MILK MARKETING IN BHILWARA DISTRICT OF RAJASTHAN

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ABSTRACT

The study carried out in Bhilwara district of Rajasthan state and analysed the various economic aspects such as marketing cost, marketing margin, price spread, producer's share in consumer's rupee and marketing efficiency of the observed marketing channels in the study area. A sample of 120 households was drawn from four randomly selected villages from two tehsils on the basis of highest milk production in Bhilwara district. In the study area, five marketing channels were identified for marketing of milk from producer to consumer viz: Channel-I: Milk Producer - Consumer, Channel-II: Milk Producer - Milk Vendor - Consumer, Channel-III: Milk Producer - Halwai - Consumer, Channel-IV: Milk Producer - Milk Vendor - Halwai - Consumer and Channel-V: Milk Producer - Village Cooperative - District Cooperative - Retailer - Consumer. The most important channel was channel-V through which maximum quantity of milk (49.09%) was sold by maximum number of producers (33.33%). The producer's share in consumer's rupee decreased with the increase in the length of the marketing channel i.e. 93.09 per cent, 86.39 per cent, 82.76 per cent, 79.90 per cent and 72.73 per cent in channel-I, channel-II, channel-III, channel-IV and channel-V, respectively. The producer's net share was the maximum in channel-I and minimum in channel-V. The price spread and consumer's price were lowest in channel-I as compared to other channels. The total marketing cost was lowest in channel-I (6.91%) and highest in channel-V (18.63%) of consumer's purchase price. The net marketing margin earned by the different channels was highest in the channel-IV. Channel-I (Producer - Consumer) was the most efficient channel followed by channel-II, channel-III, channel-IV and channel-V.

INTRODUCTION

Indian agriculture has been the main stay of Indian economy as 60 per cent of the population depends on it. Livestock plays a subsidiary role in the farm as far as food production is concerned, though their role in absorbing the huge quantities of crop residues, coarse grains, cereals by-products & farm left-over and returning valuable manure to the soil to sustain their fertility for generations is significant. Livestock in general and dairying in particular is emerging as a driving force in the growth of agricultural sector of India. Livestock are now more valued as source of food and contribute over one-fourth to the agricultural gross domestic product (GDP). The livestock sector has been growing faster than crop sector; however, in recent years, the growth both in livestock production and productivity has decelerated considerably. Dairying supplements family nutrition and also provides cow dung for fuel and farm yard manure. About three fourth of rural

household are keeping one to three milch animals. Rajasthan is the largest state in terms of geographical area in the country with about 65 per cent (Economic survey, 2013-14) work force depending on agriculture as source of livelihood. The Rajasthan state had 13.32 million cattle, 12.97 million buffalo, 9.07 million sheep and 21.66 million goat accounting for 21.52, 19.69, 19.87 and 38.18 per cent, respectively, of the total state population of livestock species. Rajasthan is the second largest milk producing state among top ten milk producing states in the country with an annual milk production of about 13.94 million tonnes and per capita per day availability of milk has increased from 292 grams in 1991 to 539 grams in 2011-12 (Annual Report, State Animal Husbandry Department, 2013-14). Unlike other farm products, the self-life of milk under rural set up is very poor. This forces the farmers to use it quickly within a short period in order to avoid loss. The return not only depends on productivity but also on sale price

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of milk. If proper channels for disposal are not available then it may affect returns adversely. On the one hand, in dairy farming, the milk must be quickly disposed off to fetch remunerative price to the milk producers and on the other hand, adequate and timely availability of inputs like green fodder, dry fodder and concentrate is crucial for increasing milk production and efficient milk production system. Thus, both the dairy inputs procurement and output disposal are very critical issues from the perspective of dairy development which influence milk production. Therefore, it is important to study the disposal pattern of milk. Keeping this in view, the present study was conducted to analyse the price spread and marketing efficiency in milk marketing in Bhilwara district of Rajasthan.

RESEARCH METHODOLOGY

Bhilwara district of Rajasthan has been purposely selected for the present study. Two tehsils were selected from the Bhilwara district on the basis of highest milk production and Further; two villages from each tehsil were selected on the basis of highest milk production. Thereafter, 60 households were selected from each tehsil. Thus, total 120 milk producer households were considered for study. The selected respondents were interviewed personally in order to get relevant information with the help of structured interview schedule. The detailed information required for the study was collected from each of selected households for the year 2014-2015. Then, the data collected were tabulated and analyzed by using the following techniques to interpret the marketing cost, marketing margin, price spread, marketing efficiency and producer's share in consumers rupees:

Marketing Cost:

$$T_c = C_p + M_{ci}$$

Where,

T_c = Total Cost of Marketing

C_p = Cost incurred by the Producer in Marketing of Milk

M_{ci} = Marketing Cost incurred by the i^{th} Middleman

Marketing Margin:

$$A_m = P_m - (P_b + M_c)$$

Where,

A_m = Absolute Margin of the Middleman

P_m = Selling Price of the Middleman

P_b = Buying Price of the Middleman

M_c = Marketing Cost of the Middleman

Price Spread:

All the prevalent marketing channels in the study area were taken into account to work out the price spread. Price spread was calculated as the difference between the price paid by the consumer and price received by the producer farmer.

Producer's Share in Consumer's Rupees: It is the price received by the farmers expressed as percentage of the retail price. It is calculated as

$$P_s = (P_f/P_r) \times 100$$

Where,

P_s = Producer's Share in Consumer's Rupee

P_f = Producer's Purchase Price

P_r = Retail Price

Marketing Efficiency:

According to Shepherd Method, the marketing efficiency in milk marketing through different marketing channels was compared by using the following formula

$$\text{Marketing Efficiency} = \frac{V}{I}$$

Where,

V = Value of Marketed Milk or Consumer's Purchase Price (in Rs.)

I = Total Cost incurred in the Marketing Process of Milk (in Rs.)

RESULTS AND DISCUSSION

Marketing of Milk:

The marketing system can be said to be efficient

if the goods can be moved from the producer to the consumer with lowest cost and minimum economic waste consistent with the provision of services of the consumer's desire. The study may be helpful in judging and rationalizing the marketing efficiency of marketing system. Therefore, this section examines the marketing margin, costs, price spread and marketing efficiency in different marketing channels.

Marketing Channels involved in Milk Marketing

There were different channels through which the milk was distributed from producer to consumer. The following five milk marketing channels were identified in study area.

Channel-I : Milk Producer-Consumer

Channel-II : Milk Producer-Milk Vendor-Consumer

Channel-III : Milk Producer-Halwai-Consumer

Channel-IV : Milk Producer-Milk Vendor-Halwai-Consumer

Channel-V : Milk Producer-Village Cooperative-District Cooperative-Retailer-Consumer

In the study area the milk producers used cooperative and private agencies for disposal of the milk. The relative importance of different marketing channels is shown in Table 1. The table shows that the most of the milk was supplied by channel V followed by channel IV, III, II and I.

It was observed that out of 120 milk producers, 15, 20, 25, 20 and 40 milk producers used channel I, II, III, IV and V, respectively accounted for 12.50, 16.67, 20.83, 16.67 and 33.33 per cent of the total milk producers, respectively. The quantity of milk sold per day by these channels was 158, 357, 462, 785 and 1697 litres, respectively accounted for 4.57, 10.32, 13.36, 22.69 and 49.06 per cent of the total milk sold, respectively. Thus it can be concluded that channel V (Milk Producer-Village Cooperative-District Cooperative-Retailer-Consumer) is the most important channel through which maximum number of milk producers (33.33%) was also moved highest quantity of milk which accounted 49.06 per cent through this channel. Channel IV (Milk Producer- Vendor-Halwai-Consumer) was the next important channel through

which 16.67 per cent of the total milk producers sold the milk and the quantity of milk marketed through this channel was 22.69 per cent of the total quantity of milk sold.

Table 1 Different Marketing Channels for milk marketing

S.No.	Channels	Number	Milk Households Marketed (Qty. in liters)
I	Milk Producer-Consumer	15 (12.50)	158 (4.57)
II	Milk Producer-Vendor-Consumer	20 (16.67)	57.00 (10.32)
III	Milk Producer-Halwai-Consumer	25 (20.83)	462.00 (13.36)
IV	Milk Producer- Vendor-Halwai-Consumer	20 (16.67)	785.00 (22.69)
V	Milk Producer-Village Cooperative-District Cooperative-Retailer-Consumer	40 (33.33)	1697.00 (49.06)
Total		120 (100.00)	3459.00 (100.00)

Figures in parentheses are percentage to column total

Marketing Margins and Price Spread in Different Marketing Channels

It includes the various market charges paid by different market agencies and middlemen's share along with producer's share in consumer's price in different marketing channels. The marketing cost and margins may vary from channel and market to market. The price spread of milk marketing through channel I, II, III, IV and V are presented in Table 2.

Channel I (Milk Producer-Consumer)

The producer's share in the consumer's rupee was 93.09 per cent. The marketing cost in this channel was Rs. 2.60 per litre of milk accounting for 6.91 per cent of consumer's purchase price.

Channel II (Milk Producer-Milk Vendor-Consumer)

The producer's share in the consumer's rupee was 86.39 per cent. The marketing cost and margin of

the milk vendor was Rs. 2.80 and 2.40 per litre of milk, respectively accounting for 7.33 and 6.80 per cent of consumer's purchase price, respectively. The price spread in this channel was Rs. 5.20 per liter of milk accounting for 13.61 per cent of the consumer's purchase price.

Channel III (Milk Producer-Halwai-Consumer)

The producer's share in the consumer's rupee was 82.76 per cent. The total marketing cost was 11.03

per cent of the consumer's purchase price. The net margin of Halwai was Rs. 2.70 per litre of milk accounting for 6.21 per cent of the consumer's purchase price. The price spread in this channel was Rs. 7.50 per liter of milk accounting for 17.24 per cent of the consumer's purchase price.

Channel IV (Milk Producer-Vendor-Halwai-Consumer)

The producer's share in the consumer's rupee

Table 2: Price Spread of Milk Marketing in Channel-I to Channel-V

No. Particulars	Channels (Rs./litre)				
	I	II	III	IV	V
1 Net price received by the milk producer	35	33	36	33	32
	-93.09	-86.39	-82.76	-75.51	-72.73
2 Marketing cost incurred by milk producer	2.6	---	2.3	---	0.6
	-6.91		-5.29		-1.36
(i) Labour charges	0.8	---	0.6	---	0.2
	-2.13		-1.38		-0.45
(ii) Transportation Charge	1.2	---	1.2	---	0.4
	-1.2		-2.76		-0.91
(iii) Other Charges	0.6	---	0.5	---	---
	-1.6		-1.15		
3 Vendor sale price/Consumer or Halwai purchase price	---	38.2	---	38	---
		-100		-86.96	
4 Marketing cost incurred by the vendor	---	2.8	---	2.6	---
		-7.33		-5.95	
(i) Transportation charge	---	1.2	---	1.2	---
		-3.14		-2.75	
(ii) Refreshment expenses	---	1	---	0.8	---
		-2.62		-1.83	
(iii) Other expenses	---	0.6	---	0.6	---
		-1.57		-1.37	
5 Vendor net margin	---	2.4	---	2.4	---
		-6.28		-5.49	
6 Milk producer sale price/Halwai purchase price	---	---	38.3		---
			-88.05		
7 Marketing cost incurred by Halwai	---	---	2.5	2.9	---
			-5.75	-6.64	
(i) Labour Charge	---	---	0.6	0.9	---
			-1.38	-2.06	
(ii) Boiling charge	---	---	1.2	1.7	---
			-2.76	-3.89	
(iii) Other expenses	---	---	0.7	0.3	---
			-1.61	-0.69	
8 Net margin of Halwai	---	---	2.7	2.8	---
			-6.21	-6.41	

9	Milk producer sale price/Village Coop. purchase price	---	---	---	---	32.6
10	Marketing cost incurred by the Village Cooperative	---	---	---	---	-74.09
	(i) Transportation Charge	---	---	---	---	2.1
	(ii) Refreshment charges	---	---	---	---	-4.77
	(iii) Other expenses	---	---	---	---	1.1
11	Village cooperative net margin	---	---	---	---	-2.5
		---	---	---	---	0.7
		---	---	---	---	-1.59
		---	---	---	---	0.3
		---	---	---	---	-0.68
12	Village coop. sale price/District milk coop. purchase price	---	---	---	---	1.2
13	Marketing cost incurred by the District milk Cooperative	---	---	---	---	-2.73
	(i) Labour charges	---	---	---	---	35.9
	(ii) Boiling charges	---	---	---	---	-81.59
	(iii)Packing charges	---	---	---	---	2.9
	(iv)Cooling charges	---	---	---	---	-6.59
	(v) Other charges	---	---	---	---	0.8
14	Net margin of District milk cooperative	---	---	---	---	-1.82
		---	---	---	---	1.2
		---	---	---	---	-2.73
		---	---	---	---	0.6
		---	---	---	---	-1.36
		---	---	---	---	0.5
		---	---	---	---	-1.14
		---	---	---	---	0.4
		---	---	---	---	-0.91
15	District milk cooperative sale price/Retailer purchase price	---	---	---	---	1.2
16	Marketing cost incurred by the retailer	---	---	---	---	-2.73
	(i) Labour charges	---	---	---	---	40
	(ii) Transportation charges	---	---	---	---	-90.91
	(iii)Cooling charges	---	---	---	---	2.6
	(iv)Other charges	---	---	---	---	-5.91
17	Net margin of retailer	---	---	---	---	0.7
		---	---	---	---	-1.59
		---	---	---	---	0.9
		---	---	---	---	-2.05
		---	---	---	---	0.6
		---	---	---	---	-1.36
		---	---	---	---	0.4
		---	---	---	---	-0.91
18	Total marketing costs	2.6	2.8	4.8	5.5	8.2
19	Gross marketing margin or price spread	-6.91	-7.33	-11.03	-12.59	-18.64
20	Consumer purchase price	0	5.2	7.5	10.7	12
		0	-13.61	-17.24	-24.49	-27.27
		37.6	38.2	43.5	43.7	44
		-100	-100	-100	-100	-100

Figures in parentheses are percentage to column total

was 75.51 per cent. The net margin of the milk vendor and halwai was Rs. 2.40 and 2.80 per litre of milk, respectively accounting for 5.49 and 6.41 per cent of the consumer's purchase price, respectively. The total marketing cost was 5.50 per cent of the consumer's price. The price spread in the channel IV was Rs. 10.70 per litre of milk accounting for 24.49 per cent of the consumer's purchase price.

Channel V (Milk Producer-Village Cooperative-District Cooperative-Retailer-Consumer):

The producer's share in the consumer's rupee was 72.73 per cent. The net margin of the village cooperative, district milk cooperative and retailer were Rs. 1.20, 1.20 and 1.40 per litre of milk, respectively accounting for 2.73, 2.73 and 3.18 per cent of the consumer's purchase price, respectively. The total marketing cost was 18.64 per cent of the consumer's purchase price. The price spread in the channel V was Rs. 12.00 per liter of milk accounting for 27.27 per cent of the consumer's price.

Producer's Share in Consumer's Rupee:

Producer's share in consumer's rupee is presented

in Table 3. It was observed from table that milk producer's sold milk directly to the local consumers. Hence, producer's share in consumer's rupee were found 93.09, 86.39, 82.76, 75.51 and 72.73 per cent of channel I, II, III, IV and V, respectively and total marketing costs incurred was highest in channel-V *i.e.* 18.63 per cent of consumer's purchase price followed by channel-IV, channel-III, channel-II and channel-I. The net marketing margin was maximum in channel-IV *i.e.* 11.90 per cent. It was also recorded that consumer's purchase price were found 37.60, 38.20, 43.50, 43.70 and 44.00 per cent in channel I, II, III, IV and V, respectively.

Marketing Efficiency:

The producer's net price was highest in channel-III *i.e.* Rs. 36.00 followed by channel-I (Rs. 35.00), channel-II and IV (Rs. 33.00) and channel-V (Rs. 32.00). The marketing cost and consumer's purchase price were lowest in channel-I as compared to other channels. The table 4 shows that the marketing efficiency was highest in channel-I *i.e.* 14.46 followed by channel-II (13.64), channel-III (9.06), channel IV (7.95) and channel-V (5.37). So, from the producer's

Table 3: Producer's Share in Consumer's Rupee

Particulars	(in per cent)				
	Channel I	ChannelII	ChannelIII	ChannelIV	Channel V
Producer's Share in Consumer's Rupee	93.09	86.39	82.76	75.51	72.73
Total Marketing Costs	6.91	7.33	11.03	12.59	18.63
Producer	6.91	0.00	5.29	0.00	1.36
Vendor	0.00	7.33	0.00	5.95	0.00
Halwai	0.00	0.00	5.74	6.64	0.00
Village Cooperative	0.00	0.00	0.00	0.00	4.77
District Cooperative	0.00	0.00	0.00	0.00	6.59
Retailer	0.00	0.00	0.00	0.00	5.91
Net Marketing Margin	0.00	6.28	6.21	11.90	8.64
Vendor	0.00	6.28	0.00	5.49	0.00
Halwai	0.00	0.00	6.21	6.41	0.00
Village Cooperative	0.00	0.00	0.00	0.00	2.73
District Cooperative	0.00	0.00	0.00	0.00	2.73
Retailer	0.00	0.00	0.00	0.00	3.18
Consumer's Purchase Price (Rs.)	37.60	38.20	43.50	43.70	44.00
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Table 4. Marketing Efficiency in Different Marketing Channels

Particulars	(in per cent)				
	Channel I	ChannelII	ChannelIII	ChannelIV	Channel V
Producer's Net Price (Rs.)	35.00	33.00	36.00	33.00	32.00
Value of Milk Sold (Rs.) (Consumer's Purchase Price)	37.60	38.20	43.50	43.70	44.00
Marketing Costs (Rs.)	2.60	2.80	4.80	5.50	8.20
Marketing Efficiency	14.46	13.64	9.06	7.95	5.37

point of view, the channel-I can be considered more efficient as compared to other channels.

CONCLUSION

Five marketing channels were observed in the study area *i.e.* Channel-I: Milk Producer – Consumer, Channel-II: Milk Producer - Milk Vendor – Consumer, Channel-III: Milk Producer – Halwai – Consumer, Channel-IV: Milk Producer – Milk Vendor – Halwai – Consumer and Channel-V: Milk Producer – Village Cooperative – District Cooperative – Retailer – Consumer. The most important channel was channel-V through which maximum quantity of milk (49.09%) was sold by maximum number of producers (33.33%). The producer's share in consumer's rupee decreased with the increase in the length of the marketing channel. The producer's net share was the maximum in channel-I and minimum in channel-V. The price spread and consumer's price were lowest in channel-I as compared to other channels. The total marketing cost was lowest in channel-I and highest in channel-V. The net marketing margin earned by the different channels was highest in channel-IV. Channel-I (Producer - Consumer) was the most efficient channel followed by channel-II, channel-III, channel-IV and channel-V.

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IMPACT OF TRAINING ON GOVERNMENT OFFICIALS WORKING IN DRY LAND ARID AREAS

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ABSTRACT

Training of extension functionaries is one of the important activities in transfer of farm technologies. The effectiveness and productivity of training programmes are crucial for achieving the desired results. So it is necessary to see that the training which was organized to improve and enhance the skills of extension personnels created a positive impact or not. So this study aimed at investigating the impact of training with respect to participants' expectations, confidence & effectiveness of the Model Training Course. The results of investigation revealed that the above training had mostly positive impacts. Regarding the overall effectiveness of training, approximately fifty per cent (48.39%) of trainees rated the training was excellent and the rest rated mostly as very good. The training was also found to be highly relevant and useful to meet the training needs of the extension personnel as well as their programme implementation skills and work productivity. It is therefore recommended that the trainees trained under the present programme should apply the knowledge and skills gained through this training programme in real field conditions to improve the farm production in general and productivity in particular.

INTRODUCTION

Agriculture and allied activities constitute the single largest component of India's gross domestic product, contributing nearly 25 per cent of the total. Rajasthan, the largest state of India was formed on 1956 and occupies an area of 3.42 lakh sq. Kms. As per the planning commission categorisation of agro-climatic zones, the 9 districts of Rajasthan namely Jaisalmer, Bikaner, Barmer, Jodhpur, Nagaur, Jhunjunu, Churu, Jalore, & Sikar falls under the western dry region (IV). The diverse agro-ecosystem of this arid region accompanied with less precipitation during *Kharif* season provides very less opportunities for the small land holders to go for more than one crop. Even practicing a single crop with the less production and productivity per hectare can't suffice to feed the family members. In order to make the agriculture profitable with the limited rainfall it is essential to re-examine the farming system holistically and propose a system, which could conserve natural resources sustainably to the farmers of arid Rajasthan. Therefore it is always advised to the small holders to have a farming system with multi-components which yield results when agriculture fails.

Training is the process of acquiring specific skills to perform a job better (Jucious, 1963). Training of

extension functionaries is one of the important activities in transfer of farm technologies. It helps people to become qualified and proficient in doing some jobs (Dahama, 1979). In-service training, one of the other hand, is offered by the organization from time to time for the development of skills and knowledge of the incumbents (Halim and Mozahar, 1997). The training is provided to enrich the skill, knowledge, attitude and behavioural competencies of the extension worker, so that they could disseminate the learnt information efficiently and effectively. The effectiveness and productivity of training programmes are crucial for achieving the desired results. Evaluation is an in-built mechanism in extension and training system. It serves as a tool for efficient operation of training programmes by providing feedback. It provides an opportunity for the course / training coordinator to take corrective measures by identifying its strengths and weaknesses for improving the effectiveness of training programmes (Kumar *et al.* 2005). Evaluation also helps us to find out the impact of training programmes on trainees. In other words, evaluation helps answering these questions viz., How did the trainees react? What did they achieve? Was the training programme worth for time, money and resources? Should this training programme be continued or terminated?

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Based on the information collected above regarding the various impacts the training caused will become a yardstick to decide the future course of action for the trainings of similar nature. Keeping in view the above, the present study focuses on the impact of training with respect to participants' expectations, confidence & effectiveness of the MTC.

RESEARCH METHODOLOGY

The study was conducted with the participants, who attended the Model Training Course (MTC) at ICAR-Central Arid Zone Research Institute (CAZRI), Jodhpur during 19-26 Oct, 2010 & 10-17 Oct, 2011 on "Sustainable rainfed farming system for dry land arid areas". A total of 31 participants viz. Agriculture Supervisor, Subject Matter Specialist (SMS), Assistant Agriculture Officer (AAO), Agriculture Officer (A.O), CAO, District Horticulture Officer (DHO), Assistant Director, Senior Assistant Director, Joint Director, Deputy Director (Hort.) of state department of Agriculture, horticulture and Krishi Vigyan Kendra from seven different states including Rajasthan, Chhattisgarh, Tamil Nadu, Karnataka, Maharashtra, Manipur and Nagaland were participated. A well-structured interview schedule was prepared regarding the various aspects of training like fulfillment of expectations, level of training effectiveness, change in level of confidence among participants, learning index of trainees and opinion of trainees about the training programme. The main objective of the training was to create awareness about the existing sustainable farming systems in arid areas and to provide information on soil, water and crop management technologies for its sustainability in arid areas. The data collection was done by interviewing trainees personally. Thereafter, the collected data were analyzed, tabulated and interpreted in the light of objective of the study. The learning index was calculated by the following formula:

Learning Index =

$$= \frac{(\text{Post training score} - \text{Pre training score})}{(100 - \text{Pre training score})} \times 100$$

RESULTS AND DISCUSSION

The results of the study along with the discussion

are presented sequentially as follows:

Profile of trainees

The participants group was heterogeneous in respect of their age, sex, education and service experience. The data enfolded in Table 1 indicates that more than fifty percent (54.84%) of the participants were between 41-50 years of age, whereas 25.81 per cent were more than 50 years age and about 9.68 per cent each with below 30 years and between 31-40 years. In case of education, majority (51.61%) of the participants were found to be graduate, while 25 percent of them were post graduate followed by 6.45 per cent possessing Ph.D. With respect to service experience, it was found that nearly 41.94 per cent of the trainees had 11 – 20 years. This was followed by 32.25 per cent between 21-30 years, 22.58 per cent with less than 10 years and a single participant who gained service experience of more than 30 years.

Fulfillment of expectations

Expectations, refers to the presumption or desire of the trainees about what might happen in the future after acquiring new knowledge and skills about watershed management. The trainees were asked to elicit their responses on three point continuum viz. extremely met, fairly met and satisfactorily met with score 3, 2 and 1 respectively. The data presented in Table 2 revealed that majority (58.06 %) of the respondents felt that their expectations were extremely met by attending the training programme, followed by 32.26 per cent of the respondents who felt their expectations were fairly met. However, only 9.68 per cent of the respondents expressed that their expectations were satisfactorily met. Similar findings were reported by Koshti and Vijayaragavan (2007).

Training Effectiveness

Training effectiveness refers to the degree to which something is successful in producing a desired result or impact of a training programme. In other words, effectiveness of training conceptualized in means of gain in knowledge & understanding, increase in self-motivation & confidence level and development of positive attitude & skills. For measuring training effectiveness, the trainees were asked to give their responses on three continuum viz. highly effective, effective and less effective with

Table 1. Profile of trainees

N-31

No. Particulars	Training course 2010-11		Total	Percentage
	19-26 Oct, 2010	10-17 Oct, 2011		
1. Education				
10+2				
Graduation	11	5	16	51.61
Post graduation	6	7	13	41.94
Doctorate	1	1	2	6.45
2. Age(Years)				
Below-30	2	1	3	9.68
31-40	2	1	3	9.68
41-50	7	10	17	54.84
More than 50	7	1	8	25.81
3. Service experience (years)				
0-10	4	3	7	22.58
11-20	6	7	13	41.94
21-30	7	3	10	32.25
>30	1	0	1	3.23
4. Caste				
SC/ST	5	4	9	29.03
OBC	6	4	10	32.26
General	7	5	12	38.71
5. Designation				
Agriculture Supervisor	0	1	1	3.23
Subject Matter Specialists (SMSs)	3	3	6	19.36
Asstt. Agriculture Officer (AAOs)	4	5	9	29.04
Agriculture Officer (AOs)	1	2	3	9.68
Circle Agriculture Officer (CAOs)	0	2	2	6.45
District Horticulture Officer (DHOs)	1	1	2	6.45
Asstt. Director (Horticulture)	4	0	4	12.90
Sr. Asstt. Director (Horticulture)	2	0	2	6.45
Joint Director (Horticulture)	2	1	3	9.68
Deputy Director (Horticulture)	1	0	1	3.23

Table 2. Response of trainees under trainers training programme during 2011-12

S.No.	Particulars	Training course 2011-12		Total	Percentage
		19-26 Oct. 2010	10-17 Oct. 2011		
1.	Fulfillment of Expectations				
	a. Extremely met	11	7	18	58.06
	b. Fairly met	5	5	10	32.26
	c. Satisfactorily met	2	1	3	9.68
2.	Level of Training Effectiveness				
	b. Highly Effective	10	7	17	54.84
	b. Effective	8	6	14	45.16
	c. Less Effective	0	0.00	0	0.00
3.	Change in level of confidence among participants (%)				
	a. Before training	57.40	52.64	110.04	55.02
	b. After training	77.47	78.62	156.09	78.05
	% gain	34.96	49.35	41.85	41.85
4.	Learning Index	47.11	54.85	51.20	51.20

score 3, 2 and 1 respectively. It is evident from Table 2 that majority (54.84%) of trainees expressed that the training programme was highly effective. It was followed by 45.16 per cent respondents, who felt that the training was effective. Interestingly, none of the trainees expressed that training was less effective. The findings reflects that the importance of adoption of integrated farming system module in agriculture to reap economic benefit in arid region. Similar findings were reported by Koshti and Vijayaragavan(2007).

Change in level of confidence among participants

Confidence provides impetus for achieving objectives. Also confidence is the resultant of gain in knowledge. The trainees were asked to state the level of confidence gained after the training and their responses were recorded on the three point continuum viz., high confidence, medium confidence and low confidence with score 3, 2 and 1 respectively. The data in Table 2 depicted that level of confidence among trainees was 55.02 per cent before training. But after training, their level of confidence was raised to 78.05 per cent resulting in whopping 41.85% gain in confidence. The sharp increase in level of confidence among trainees after training was

attributed to the effectiveness of the training programme. Training imparts a perfect blend of knowledge (teaching), skill (practical exercise) and attitude to the participants who undergo this process. All these factors enhanced learning of trainees and therefore, raised their confidence, level. Similar findings were reported by Koshti and Vijayaragavan (2007).

Learning Index

The Learning Index (LI) was developed for this training and the data presented in Table-2 indicated that trainees possess the LI of 51.20 Per cent. This index distinctly shows that the trainees had a fairly good learning experience of training on rainfed farming system. This might be due to various reasons viz. subject matter delivered, experts presentation, topics of practical importance and finally the training improves the motivation and morale of the trainees.

Overall effectiveness of training

It could be inferred from Table 3 depicts that approximately fifty per cent (48.39%) of trainees rated the training was excellent followed by 45.16 per cent as very good. Only negligible percentage of participant 6.45 per cent rated as good. However,

none of the trainees expressed training programme as average. This clearly shows that the training delivered the objective for what it was designed for.

Table 3. Overall opinion of trainees towards training

No.	Opinion of trainees	Frequency	Percentage
1.	Excellent	15	48.39
2.	Very good	14	45.16
3.	Good	2	6.45
4.	Average	0	0.00

Feedback on training atmosphere and methodology

The feedback from participants were collected and presented in Table 4. The feedback clearly reflects that the majority (90.32 %) of participants were fully satisfied with the atmosphere of training, as it pave way for free exchange of ideas between the trainees and the trainers. Similarly, they are fully satisfied (90.32 %) with medium of instruction, training methods (61.29 %), use of audio visuals (67.74 %), relevance of content (70.97 %), adequacy of content (67.74%) and sequencing of content (64.52 %). Further they were satisfied fully (32.26 %) and to a limited extent (51.61%) in connection with the practical orientation of the training. Further the participants suggested to include the following topics namely processing of *aloevera*, mushroom

cultivation, bee keeping, nutritional management of arid crops, processing and value addition of horticultural crops, preparation of bio pesticides, agricultureschemes and policies of Rajasthan state, management of crops and soils in different regions of India, rabbit farming and fishery, model farming system state wise for the training programmes in future.

CONCLUSION

The present study reveals that the participants expressed about the training programme on sustainable rainfed farming system for dry land arid areas was a rich learning experience. More than fifty per cent (58.06%) of the trainees felt that their expectations were extremely met by attending the training programme, whereas about 54.84 per cent of participants perceived that training programme was highly effective. The study further depicts that about 78.05 per cent of trainees had developed high level of confidence after training and the learning index of trainees was found to be 51.20 percent. This could be clearly said that this training definitely yields significant and positive impacts on improving motivation, morale and the skills of extension personnels. Further this training programme has immensely helped the trainees in improving the knowledge and sharpens their mental skills. It is therefore recommended that the trainees trained

Table 4. Feedback on training atmosphere and methodology

S.No	Item	Degree of satisfied					
		Fully		To a limited extent		Not at all	
		f	%	f	%	f	%
1.	Atmosphere	28	90.32	3	9.68	-	-
2.	Medium of instruction	28	90.32	3	9.68	-	-
3.	Training method	19	61.29	12	38.71	-	-
4.	Use of AV aids	21	67.74	10	32.26	-	-
5.	Timely information of day to day activity	19	61.29	10	32.26	2	6.45
6.	Duration of programme	24	77.42	6	19.35	1	3.23
7.	Relevance of content	22	70.97	9	29.03	-	-
8.	Adequacy of content	21	67.74	10	32.26	-	-
9.	Sequencing of content	20	64.52	9	29.03	2	6.45
10.	Practical orientation	10	32.26	16	51.61	5	16.13

under the present programme should apply the knowledge and skills gained through this training programme in real field conditions to improve the farm production in general and productivity in particular.

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KNOWLEDGE OF TRIBAL BENEFICIARIES ABOUT EMPLOYMENT GENERATION ACTIVITIES OF KVK

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ABSTRACT

This study was an attempt to get the response regarding personal profile and Knowledge of tribal beneficiaries about employment generation activities of KVK in Dungarpur district of Rajasthan. Complete list of vocational training beneficiaries of KVK Dungarpur was prepared and 100 respondents were selected randomly in the sample of the study. Data were collected through tailor made interview schedule. Thereafter, data were analyzed and results were interpreted. It was found that majority of the beneficiaries of Dungarpur fell under high level knowledge group and majority of beneficiaries of Simalwara fell under medium level knowledge group. It implied that tribal farmers of Dungarpur defiantly had a good exposure of various training programmes organised by KVK.

INTRODUCTION

Vocational trainings for practicing farmers, farm women and young farmers is a critical input for accelerating agriculture production as a long term strategy. The basic aim of KVKs is to improve their technical literacy and they are designed to impart skill oriented training through work experience and "learning by doing". The vocational trainings offered by KVK Dungarpur are practical in nature and provides opportunities to establish self enterprises for livelihood. These vocational training have many dimension but the ultimate goal is employment generation in rural areas. Hence, this aspect is a key indicator to assess the knowledge of tribal farmers about employment generation activities of KVK. The present study was conducted to understand the knowledge of tribal beneficiaries of KVK about employment generation activities.

RESEARCH METHODOLOGY

The present study was conducted in the purposely selected Dungarpur and Simalwara tehsils of Dungarpur district of Rajasthan. Five villages from each selected tehsil were taken on the basis of maximum tribal population. Thus, in all 100 farmers were included in the sample of the study. Data were collected through tailor made interview schedule. To study the personal profile of the respondents and knowledge of tribal beneficiaries of KVK about employment generation activities, they were put in

to three category viz. low, medium and high knowledge level and accordingly, frequency and percentage were calculated. Individual aspect wise knowledge about various employment generation activities was also worked out. To work out the aspect wise knowledge, MPS was calculated and rank was assigned accordingly. Thereafter, data were analyzed and results were interpreted.

RESULTS AND DISCUSSION

As presented in Table 1, the study revealed that majority of tribal beneficiaries i.e. 53.00 per cent of the total respondents belonged to medium age group, 30.00 per cent of the respondents were educated upto primary, 32.00 per cent respondents were labour, 33.00 per cent respondents had annual income from Rs. 10,000 to 1.0 lakh per annum, 30.00 per cent respondents were landless, 59.00 per cent farmers were living in joint family and 29.00 per cent respondents were participant of only one organization.

Knowledge of tribal beneficiaries of KVK about employment generation activities

The data presented in Table 2 reveals that 23.00 per cent respondents had low level of knowledge, while 40.00 per cent of the respondents possessed medium level of knowledge about employment generation activities. A considerable number of respondents i.e. 37.00 per cent were observed in high level knowledge group. Further observation of data

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Table 1. Distribution of the respondents according to their personal characteristics**n=100**

S.No.	Age (in years)	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1.	Low (< 28 years)	12	24.00	10	20.00	22	22.00
2.	Medium (28-52 years)	25	50.00	28	56.00	53	53.00
3.	High (> 52 years)	13	26.00	12	24.00	25	25.00
	Total	50	100.00	50	100.00	100	100.00
S.No.	Level of distribution	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1.	Illiterate	8	16.00	20	40.00	28	28.00
2.	Upto primary	20	40.00	12	24.00	32	32.00
3.	Upto higher secondary	12	24.00	10	20.00	22	22.00
4.	Graduate or above	10	20.00	8	16.00	18	18.00
	Total	50	100.00	50	100.00	100	100.00
S.No.	Occupation	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1.	Labour	12	24.00	20	40.00	32	32.00
2.	Agriculture	16	32.00	11	22.00	27	27.00
3.	Business	12	24.00	10	20.00	22	22.00
4.	Service	10	20.00	9	18.00	19	19.00
	Total	50	100.00	50	100.00	100	100.00
S.No.	Annual income	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1.	Rs. 10,000 to 1.0 lakh per annum	15	30.00	18	36.00	33	33.00
2.	Rs. 1.0 lakh to 2.5 lakh per annum	12	24.00	13	26.00	25	25.00
3.	Rs. 2.5 lakh to 5.0 lakh per annum	12	24.00	10	20.00	22	22.00
4.	Above Rs. 5.0 lakh per annum.	11	22.00	9	18.00	20	20.00
	Total	50	100.00	50	100.00	100	100.00
S.No.	Size of land holding	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1.	Landless	12	24.00	18	36.00	30	30.00
2.	Less than 1.0 hac.	15	30.00	13	26.00	28	28.00
3.	1.0–2.0 hac.	12	24.00	10	20.00	22	22.00
4.	More than 2.0 hac.	11	22.00	9	18.00	20	20.00
	Total	50	100.00	50	100.00	100	100.00

S.No.	Family type	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1	Nuclear	22	44.00	19	38.00	41	41.00
2	Joint	28	56.00	31	62.00	59	59.00
	Total	50	100.00	50	100.00	100	100.00

S.No.	Social participation	Dungarpur tehsil		Simalwara tehsil		Total	
		f	%	f	%	f	%
1.	No participation	12	24.00	15	30.00	27	27.00
2.	Member of one organization	15	30.00	14	28.00	29	29.00
3.	Member of more than one organizations	13	26.00	12	24.00	25	25.00
4.	Member of local committees	10	20.00	9	18.00	19	19.00
	Total	50	100.00	50	100.00	100	100.00

f = frequency, % = percentage

Table 2. Distribution of respondents on the basis of their level of knowledge about employment generation activities.

n=100

S.No.	Category	Dungarpur tehsil		Simalwara tehsil		Total	
		F	%	F	%	F	%
1.	Low (< 98)	12	24.00	11	22.00	23	23.00
2.	Medium (98-117)	18	36.00	22	44.00	40	40.00
3.	High (> 117)	20	40.00	17	34.00	37	37.00
	Total	50	100.00	50	100.00	100	100.00

makes it clear that maximum number of tribal beneficiaries of Dungarpur i.e. 40.00 per cent had high level of knowledge, followed by 36.00 per cent with medium level of knowledge about various employment generation activities of KVK. On the other hand, 22.00 per cent tribal beneficiary respondents of Simalwara tehsil were reported to have low level of knowledge, 44.00 per cent had medium level of knowledge and 34.00 per cent tribal beneficiaries of Simalwara had high level of knowledge. It is interesting to note that only 12.00 per cent tribal beneficiary respondents of Dungarpur possessed low level of knowledge about employment generation trainings of KVK.

Aspect wise extent of knowledge of tribal respondents

Individual aspect wise knowledge of tribal beneficiaries was also worked out for drawing a picture about the areas of training where tribal beneficiaries had good knowledge and where they are lacking, so that aspects with low knowledge can be given more importance in future.

For working out the knowledge of respondents (both Dungarpur and Simalwara) toward different aspects of Krishi Vigyan Kendra, in all 11 statements related to knowledge of KVK were considered. The mean per cent score (M.P.S.) was calculated for each

statement and rank was assigned accordingly. The results have been present in Table 3.

From the data incorporated in Table 3, it is clearly evident that most of the tribal beneficiaries strongly agreed to have high knowledge about poultry management with MPS 89.75 and ranked first. Further analysis of table clearly indicates that nursery management activity was positively considered by tribal beneficiaries with MPS 82.76 and was ranked second.

Table 3 further shows that statement "preservation of products" and "organic farming/vermicompost" was considered by beneficiaries respondents with MPS 76.85 and ranked third. Likewise, tribal beneficiary respondents strongly knew "dairy management" with MPS 67.37 and ranked fourth.

The knowledge about "off season vegetable production" and "mushroom cultivation" was noted and tribal beneficiary respondents had knowledge of these facts with MPS 67.25 and ranked fifth. Further analysis of table shows that the tribal beneficiary respondents had knowledge about "goat rearing" with MPS 63.29 ranked sixth.

The data presented in Table 3 also show that tribal beneficiary respondents of the study area possessed knowledge about "artificial insemination" with MPS 61.47 and ranked seventh. Regarding the knowledge about "propagation of plants" and "stitching for women", tribal beneficiary respondents recorded MPS of 58.05 and ranked eighth in the rank order.

CONCLUSION

It was concluded that majority of the beneficiaries of Dungarpur fell under high level knowledge group and majority of beneficiaries of Simalwara fell under medium level knowledge group, it implies that tribal farmers of Dungarpur definitely had a good exposure of various training programmes organised by KVK and they are located near to KVK, and hence, scored higher in knowledge test as compared to Simalwara. From the above results it may be concluded that majority of tribal beneficiaries of KVK Dungarpur possessed maximum knowledge about poultry management and nursery management. These are the area where they not only acquired trainings from Krishi Vigyan Kendra, Dungarpur but also they are engaged in poultry and nursery management activities to a high extent. Hence, they possessed high knowledge about these aspects while their poor

Table 3. Aspects wise knowledge of tribal respondents

S.No.	Aspects	Beneficiaries	
		MPS	Rank
1.	Dairy management	67.37	IV
2.	Organic farming/ vermicomposting	76.85	III
3.	Off season vegetable production	67.25	V
4.	Propagation of plants	58.05	VIII
5.	Nursery management	82.76	II
6.	Goat rearing	63.29	VI
7.	Poultry management	89.75	I
8.	Stitching for womens	58.05	VIII
9.	Mushroom cultivation	67.25	V
10.	Preservation of products	76.85	III
11.	Artificial insemination	61.47	VII
Average		68.69	

MPS = Mean per cent score

knowledge about artificial insemination, propagation of plants and stitching for women indicates that they have less involvement in these areas of employment activities because of poor trainings organised by KVKs on these aspects.

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ENHANCEMENT OF PEARL MILLET PRODUCTION AND PRODUCTIVITY THROUGH PARTICIPATORY RURAL APPRAISAL (PRA)

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ABSTRACT

Participatory Rural Appraisal (PRA) is a set of effective methods undertaken for identifying, assessing, and prioritizing problems for the village community and the steps taken to solve that. It is a planning methodology in which the community themselves actively participate and analyze the situations to find solutions. The present study was conducted in the institute adopted village Ujaliya of Jodhpur district revealed that the pearl millet productivity is as low as 8-9 q/ha with an alarming decrease of ground water level. The reasons dominated for low yield of pearl millet in the village were lack of improved seeds, lower soil fertility status, old age production techniques, lower productivity per ha. of land, salinization of both land and water due to excessive drilling & low rainfall coupled with poor quality ground water. Based on the PRA, an action plan was prepared & the action initiated collectively.

INTRODUCTION

Participatory Rural Appraisal (PRA) is a term emerged in the late 1980s or early 1990s and has been called as 'an approach and method for learning about rural life and conditions from, with and by rural people' (Chambers, 1992). It is considered as one of the popular and widely advocated methodology for compiling and processing the information collected at village level to take appropriate decision focused for rural areas. It derives its strength from the participation of local people right from the beginning stage (Mukherjee, 1993), making it more reliable and cost effective and to be increasingly used in agricultural research and development programmes. This technique is also considered to be one of the most effective tools, which could be utilized to understand the locally available resources, existing cropping cycle & cropping pattern, available technology profile of the farming community and to get the first hand information about the individual and village needs, priorities, problems, prospects and available solutions of the farming community (Rajula Chandran *et al.*, 2004).

PRA as a method, participative and empowering

the resource poor farmers to critically made aware their own agro-ecosystems by merely facilitating and enabling them to act upon by taking responsibility and sharing the information gathered with their fellow farmers. This process will definitely help them to understand the rural development activities, technology dissemination process, linkage mechanisms existing among research, training and extension, credit and input supply systems (Jones, 1995; Mathialagan, 2000). Keeping the above, the present study was undertaken to identify the best possible solutions to improve the pearl millet productivity through participatory mode.

RESEARCH METHODOLOGY

The study was conducted at Ujaliya village of Baori block in Jodhpur district of Rajasthan with population of 1802 with 418 households. Agriculture is the primary occupation for the majority of the households. Bajra, Moong, Guar, Sesame, Cotton & Castor crops are grown during Kharif, while Wheat, Mustard, Cumin, Carrot are in Rabi. Majority of the farmers belong to large farmers category possess land holding of more than 4 ha. In spite of possessing large land holding the decreasing trend in

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productivity of major crops provide ample scope for technological interventions. The PRA exercises were carried out in order to identify and prioritize problems and apprising strategies to tackle are discussed below.

RESULTS AND DISCUSSION

Agro-Ecosystem & Transect Details

In order to get a clear idea about the location and distribution of resources, features, landscape & mainland, a walk was conducted throughout the village diagonally in a particular direction along with the informants. During the walk it was observed (Fig. 1) that Ujaliya village of Baori block is located at 26°29'N latitude and 73°04'E longitude and an elevation of 251 MSL at Jodhpur district of Rajasthan state. It falls under the western dry region (Type XIV) of the classification of agro-climatic zones under Planning Commission. On an average, the area receives approximately 350 mm rainfall in an year with major share from South-West Monsoon. The

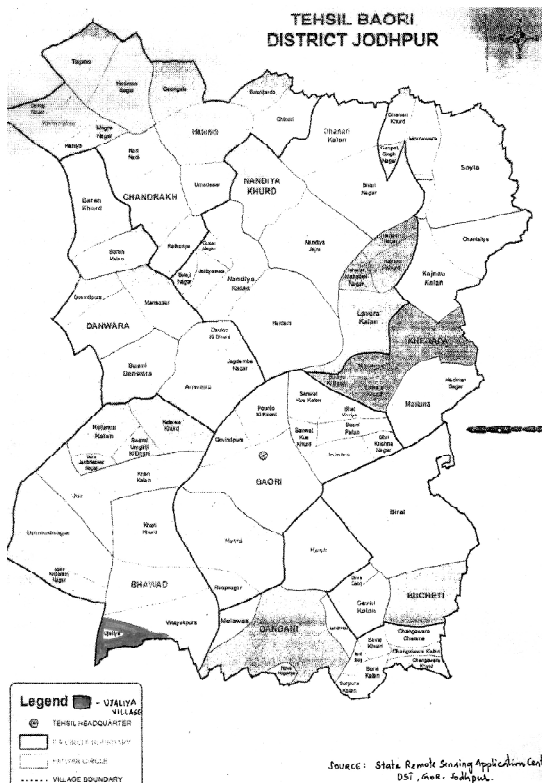


Fig. 1 : Baori tahsil



Fig. 2 : Agro-ecosystem transect walk

temperature ranges from 49°C during summer to 0°C in winter. The northern side have higher elevation, bordered with hills and reserve forest areas while sloping towards south (Fig.2). Rain and tube well are the major source of irrigation. The transect information is presented below in Table 1.

Social & Resource Map

Participatory mapping is one of the versatile tools and is powerful in generating pictures from the villagers' imagination on any aspect. But these maps cannot be compared with the real geographical maps. Initially the villagers prepared (Fig. 3 & 4) the village profile on the floor with available colours, sticks, flowers, toys, etc. The maps also provided the detailed information about village boundaries, existing social institutions, soil types, cropping pattern, fields, community halls, common infrastructure facilities, water storage tanks, settlement pattern etc. The area is dominated by Rajputs followed by Meghwal, Bheel and Muslim families. The village has two middle schools (up to

Table 1. Village Transect

Parameters	Particulars of the village	
Topography	Plain land (70%)	High land (30%)
Productivity	Low	Barren uncultivable land
Soil type	Vertisol with sandyloam	Vertisol with alkalinity
Crops	Bajra, Moong, Guar, Sesame, Cotton, Wheat, Mustard	Uncultivable
Vegetables	Chilly, Onion, Garlic, Carrot, Cabbage	Barren rocks
Livestock	Cow + Buffalo + Goat	Sheep
Water resources	Tube well	Pond
Fodder crop	Bajra + Jowar + Perennial grasses	Perennial grasses
Tree	Neem, khejri, babool, kumut, hingota, rohida&kair.	Khejri, babool, kumut, hingota, rohida&kair.
Fruit trees	Mango &Ber	-
Soil water conservation	Field bunding& pond	Pond
Employment	Agriculture + animal husbandry + Labour	-
Govt. Infrastructure	Middle school + Primary school	-
Problems	Pest and diseases, marketing, electricity	Barren uncultivable
Opportunities	Suitable crop improved varieties, diversification, crop rotation & fruit trees plantation	To bring certain areas into cultivable.

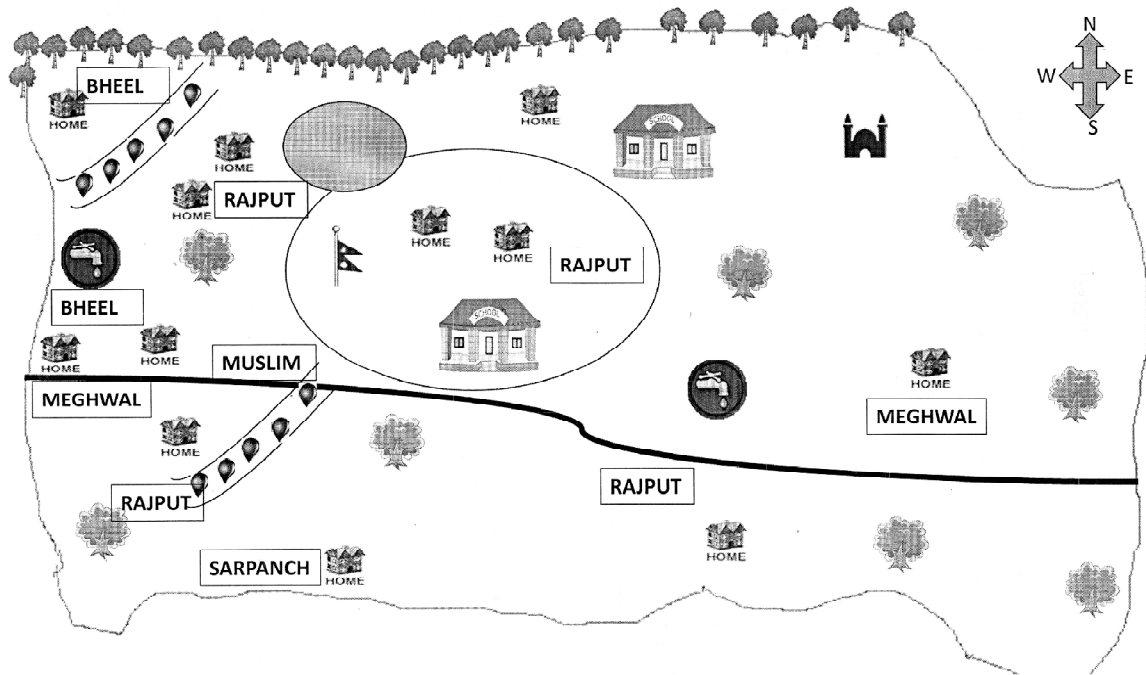


Fig. 3 : Social map

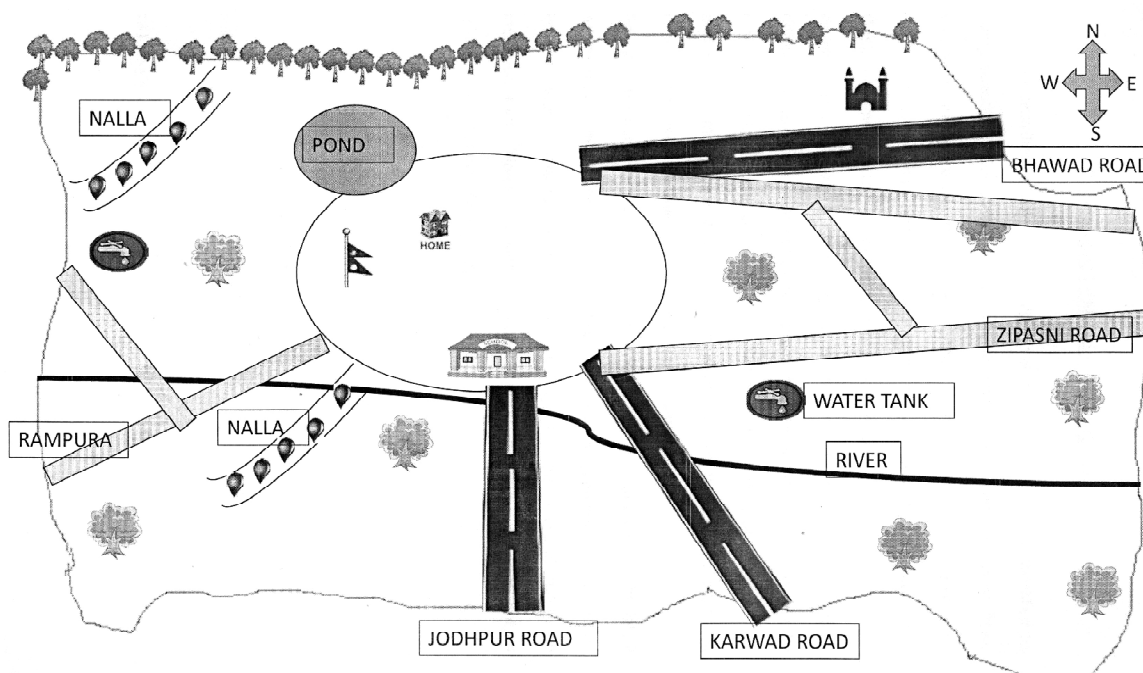


Fig. 4 : Resource map

8th) and one primary school. Farmers of the village can be categorized as marginal (<1 ha.), small farmers (1-2 ha.), medium (2-5 ha.) and big farmers (>5.0 ha.). Out of the total area of 1316.55 ha the net sown area were 861.03 ha. with bajra and wheat are the main crops during kharif and rabi. The soil type is aridisol with sandy loam and the tube well is the main source of irrigation.

Time line

The elderly villagers or the informants narrated the information regarding the important changes that have taken place in the village chronologically, pertaining to agriculture, animal husbandry and horticulture. The time line for different agricultural related activities are given in Table. 2.

Trend Analysis

The trend analysis gives insight on various facts such as changes in land-use and cropping pattern. This method clearly exhibited the changes / fluctuations that have occurred over a period of time. Though the new varieties released every year in bajra and wheat crops, the constantly reducing water table

and decreasing rainfall is a major drawback observed in arid agriculture. The trend over the years reflected bajra and wheat are the important food crops and the cropping system is almost stable over the last two to three decades. Unavailability of improved varieties along with pest and diseases in agricultural and horticultural crops is a serious concern observed during this analysis.

Seasonal analysis (SA)

Seasonal analysis is one of the popular PRA methods that determines month or season patterns and trends throughout the year in the village. It is also called seasonal calendar, seasonal activity and seasonal diagram. This analysis revealed that the villagers receive major rainfall during *kharif* (July–September) season, while summer it is almost nil and during the *rabi* they use pressurized irrigation (tube wells) to save their standing crops. SA also helped us to identify the period which are critical in respect of the growing different crops, fodder shortages and animal diseases occurrence. Dairy, goat and sheep rearing are the most practiced enterprises in animal husbandry.

Table 2. Time Line of Agriculture Related Activities at Ujaliya

Sl. No	Particulars	Years
1.	Domestication of cow, goat, sheep & camel	1400
2.	Ujjwal ji Purohit made the first village Ujaliya	1572
3.	Cultivation of desi bajra, guar, moth, moong, til, etc.	1900
4.	Camel & ox were used as traditional means of farming	1972
5.	Introduction of hybrid bajra 1, 2,3, 4 & vegetable cultivation	1975
6.	Village was faced by severe drought	1975-80
7.	Tractor (Escort made) introduced and used for ploughing	1977
8.	Usage of farm instruments & first electricity connection was given in village	1980
9.	Tube well was introduced for water upliftment in village	1985
10.	Severe drought reoccurred	1987
11.	Introduction of HHB-67 bajra & dual purpose varieties came in prominence	1995
12.	Introduction of bajra seeds released by private companies	1998
13.	Introduction of PUSA 444 (MH 444) Bajra&Thresher	2000
14.	Introduction of Proagro 9444	2005
15.	Introduction of Bajra 7680 (MH 795)	2010
16.	Introduction of Proagro 9555	2012
17.	Introduction of RHB – 177	2014

Crop Calendar

Crop calendar is a schedule of the crops growing season from the fallow period and land preparation to crop establishment, maintenance, harvest and storage. It provides information for the extension workers to decide the appropriate crop interventions before implementing any programme focused on crop production. The villagers were enthusiastic and involved themselves in revealing the seasonality of various crops grown and agricultural operations carried throughout the year. The calendar indicated that sowing of bajra & moong was taken during the month of June & July while the harvesting was done on September for both crops. Wheat sowing is taken up during November - December and the harvest is done during the month of March - April.

The major pest identified during this interaction were termites, which affects most of the important crops viz., bajra, moong & wheat. In case of diseases, green ear head, blast and ergot attacks bajra, while root rot, yellowing, yellow mosaic & cercospora leaf spot are the major diseases in moong. In wheat the

black smut disease and nematode infestations are more during the *rabi* season.

Matrix Ranking

The matrix ranking was done in a village to analyse the options of multiple criteria. It gives a clear cut idea about the preference and attitude of the villagers towards a particular topic of interest / things. During the discussion with the farmers it was inferred that cultivating bajra is more economical and beneficial because of its dual purpose (consumption and fodder) usage (Table. 3). Whereas between moong and wheat, moong being a pulse crop and contains more protein, it is consumed more in home as well as gets more mileage due to its high price in market. Even though, moong is more prone to attack by pest and diseases it easily survive in the less rainfall with less expenditure compare to growing wheat.

Livelihood analysis

The livelihood analysis was conducted within the village in the context to identify the villagers' primary and secondary occupation. It was found that these

villagers have been practicing agriculture for many years and in the last decade, there has been an increasing shift towards growing horticulture. Their economic network and the level of social participation is very weak. Even though, majority of them are big farmers and live near to the district headquarter their standard of living was found to be very low. The spent mainly for their food. In spite of depleting ground water level observed these days they practice intensive agriculture using pressurized irrigation system. Efforts are being made to identify the best method for disposing the farm product from the village.

Table 3. Matrix Ranking

Particulars	Crops		
	Bajra	Wheat	Moong
Variety	New	New	New
Seeds availability	1	1	1
Weeds	2	3	2
Water requirement	2	3	2
Labour requirement	3	2	2
Expenditure	1	3	2
Pest	2	2	3
Diseases	2	2	3
Yield	1	2	3
Profit	1	2	3

1= Low, 2 = Moderate, 3 = High

Gender Analysis

According to information by the informants, women of all castes invariable engaged in households activities viz., cooking, child rearing, cleaning and washing. Regarding the agricultural activities they are mostly involved in sowing, hand weeding and harvesting operations, whereas their counterparts involved in major physical work namely, field preparation, manuring, intercultural operations viz., earthing up, thinning, irrigation, spraying of pesticides and fungicides, harvesting and marketing operations (Table.4). It was also observed that in all categories regardless of income, women supports the male counterparts in animal husbandry and households chores.

Table 4. Gender Analysis

Farm operations	Participation	
	Men (%)	Women (%)
Field preparation	90	10
Seed Treatment	100	-
Herbicide application	100	-
Sowing	30	70
Hand weeding	10	90
Thinning	100	-
Manuring	100	-
Irrigation	100	-
Plant protection	100	-
Harvesting	40	60

Venn diagram

Venn diagram aims to get the villagers perspective in identifying the existing institutions and individuals, their relationship and influence in decision making process (Fig. 5). The knowledge of the available institutions in nearby vicinity will encourage the

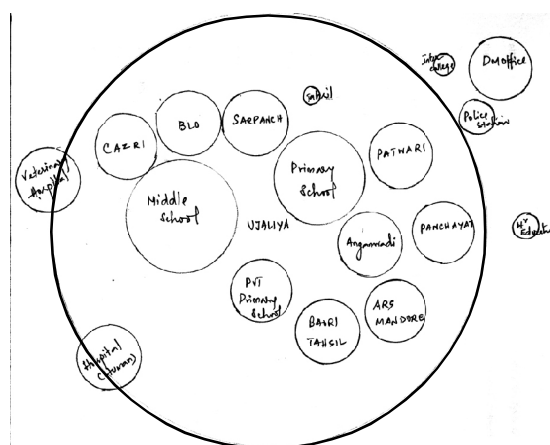


Fig. 5 : Venn diagram

villagers in establish relationship among the identified institutions in the development process of the village. The villagers of Ujaliya identified Agricultural Research Station (ARS), Mandore, ICAR- Central Arid Zone Research Institute and other state government organizations are the agencies where they approach to get information in agriculture and allied disciplines as and when required. In this process it was also revealed that school occupies an important position in the village and the villagers

showed a positive response in enrolling their wards to get the education up to middle level. Further as there is no high / higher secondary school near to the village, the children need for higher education is still unanswered.

Problem Prioritization

Based on the various methods of PRA viz., agro-ecosystem / transect analysis, livelihood analysis, mapping, trend & seasonal analysis, matrix ranking and focused group discussion with the villagers, various problems were identified and prioritized according to their importance in relation to pearl millet. Further, during the interaction with the villagers, the factors behind the low yield of pearl millet were also found. The various factors inhibiting on- farm pearl millet production were soil fertility status, unavailability of improved seeds, production techniques, production potential of the land and the level of market integration etc. Salinization of both land and water due to excessive drilling is now seen as a very serious threat to the health of the living beings of the village. Decreasing water table and increasing pest and disease problems further reduced the yield. Unavailability of required inputs on time and lack of information about scientific cultivation practices are also the probable reasons for the low productivity of pearl millet.

Proposed Action plan

The goal of the proposed action plan is to prepare a comprehensive frame work to maximize profit with reduced inputs for improving the productivity of pearl millet by identifying location specific, high yielding, drought and saline tolerant suitable improved varieties. Farmers should be taught initially about the benefits of soil testing, economic usage of fertilizer and better soil management practices. It is also equally important to make the villagers to understand the application of right kind of fertilizer at right time at right place and at right quantity to get higher profit. On farm participatory research should be taken at farmers' field to emphasize the importance of good cultivation practices right from selection of improved dual purpose variety, seed treatment, manuring, pre-emergence herbicides application, importance of line sowing, maintaining optimum plant population, integrated pest and disease management

and appropriate harvesting time are vital for increasing production and productivity of pearl millet. Further consistent capacity building programmes namely short-term and long-term training and education programmes on pearl millet, method demonstrations, field days, small group meetings and goshties must be organized to showcase and promote change in knowledge, skill and attitude of the farmers. Apart from the above, efforts should be made for formation of groups and farmer-based organisations (FBO) in enhancing their role in input procurement and output marketing.

CONCLUSION

PRA is a methodology comprises of various tools and techniques to identify critically the existing problem at village level, with a clear cut objective in which the villagers feel comfortable and committed to find out the successful solution with in the available resources. This reorientation is the major strength in finding out the real dimensions and lay emphasis on empowering local people to assume an active role as analyzers. The study clearly narrated the the reasons for low productivity in bajra cultivation. Steps are being taken and collaborative on farm participatory trials are being carried out in farmers field by ICAR-CAZRI scientists to exhibit the importance of good cultivation practices in various crops in general and bajra in particular.

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ATTITUDE OF BENEFICIARY FARMERS TOWARDS NATIONAL HORTICULTURAL MISSION

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ABSTRACT

The present investigation was conducted in randomly selected Mehsana district of Gujarat state to know the Attitude of beneficiaries about National Horticulture Mission and its relation with their profile. The data were collected personally with the help of structured interview schedule from 120 respondents from three randomly selected taluka of the districts. It was observed that majority of the beneficiaries of National Horticultural Mission were middle aged, educated up to secondary school and having large land holding and occupation farming. Regarding experience in horticulture, extension contact, source of information, economic motivation risk orientation, overall awareness majority of them were under medium category and neutral Attitude of National Horticultural Mission, It was observed that out of ten independent variables, age, land holding and extension contact had positive and significant relationship with Attitude.

INTRODUCTION

The National Horticulture Mission has provided a fillip to the horticulture sector, resulting in a significant increase in Horticulture business activities, besides bringing in vibrancy in the agricultural economy. It focus in the area of horticultural research development, post harvest management, processing and marketing. The programme under horticultural development aims at increasing the production and productivity of all horticultural crops through timely adoption of improved technologies in crop production. Governments of India focus more attention towards horticultural programmes for providing relief and rescue measures to the small and marginal farmers through National Horticulture Mission.

So with aim to know the Attitude of farmers towards National Horticultural Mission, the present investigation was undertaken with the objectives : to study socio-economic and personal characteristics of the beneficiaries of National Horticultural Mission, to know the extent of Attitude of the beneficiaries about National Horticultural Mission and to find out relationship between socio-economic and personal characteristics of the beneficiaries with their Attitude about National Horticultural Mission

RESEARCH METHODOLOGY

The present investigation was conducted in randomly selected Mehsana district of Gujarat state. Mehsana district is composed of 9 taluka. From which three taluka viz. Mehsana, Kheralu and Satlasana were selected randomly. Four villages from each selected taluka were selected randomly. From each selected village ten beneficiaries by making sample of 120 respondents of National Horticultural Mission which had implemented this scheme in year 2005 were selected randomly. The data from selected 120 beneficiaries were collected by contacting them personally through structured interview schedule. Frequencies, percentage, standard deviation, correlation coefficient, were employed to find out the results.

RESULTS AND DISCUSSION

Socio-economic and personal characteristics of the beneficiaries of National Horticultural Mission

It can be seen from Table 1 that majority of respondents (75.00 per cent) were from middle age group followed by old age group (22.50 per cent) and young age group (02.50 per cent). Majority of respondents were educated up to secondary school level (37.50 per cent), followed by higher secondary

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level (29.17 per cent). 28.33 per cent of them were educated upto graduation and above. It was further noticed that 3.33 per cent respondents were illiterate and (1.67 per cent) educated only primary education.

It is also observed from Table 1 that slightly more than half (51.67 per cent) belonged to medium size family followed by near about two fifth (39.17 per cent) of respondent were from small family. Only one tenth (9.16 per cent) were from big families.

Further Table 1 indicates that three fourth (75.00 per cent) of the beneficiaries of National Horticulture Mission had medium experience in horticultural crop farming whereas, 13.33 per cent and 11.67 per cent of them had low and high experience in horticulture respectively. Majority of respondents nearly half (45.00 per cent) of the beneficiaries of National Horticulture Mission were possessed large land holding farmers. Whereas 30.00 per cent and 23.33 per cent and 01.67 per cent of them possessed medium, small and marginal size of land holding, respectively.

Table 1. Distribution of the respondents according to their socio-economic and personal characteristics

(n=120)			
No.	Category	Frequency	Percentage
Age			
1	Young	03	02.50
2	Middle	90	75.00
3	Old	27	22.50
Education			
1	Illiterate	04	03.33
2	Primary education	02	01.67
4	Secondary education	45	37.50
4	Higher secondary education	35	29.17
5	Graduation and above	34	28.33
Experience in horticulture			
1	Low	16	13.33
2	Medium	90	75.00
3	High	14	11.67
Land holding			

1	Marginal	02	01.67
2	Small	28	23.33
3	Medium	36	30.00
4	Large	54	45.00

Occupation

1.	Farming	82	68.33
2	Farming with Animal husbandry	29	24.17
3	Farming with business	09	7.50

Extension contact

1	Low extension contact	32	26.67
2	Medium extension contact	59	49.17
3	High extension contact	29	24.16

Sources of information

1	Low	21	17.50
2	Medium	85	70.83
3	High	14	11.67

Economic motivation

1	Low economic motivation	17	14.17
2	Medium economic motivation	85	70.83
3	High economic motivation	18	15.00

Risk orientation

1	Low risk orientation	12	10.00
2	Medium risk orientation	95	79.17
3	High risk orientation	13	10.83

In case of occupation, it was noticed that farming was prime occupation for most (68.33 per cent) of the farmers in study area. Followed by subsidiary occupation 24.17 per cent and 7.50 per cent of the respondents were engaged in farming along with animal husbandry and farming along with business, respectively. In case of extension contact, 49.17 per cent of respondents had medium extension contact, However 26.67 per cent had high and 24.16 per cent were having low extension contact. Table 1 clearly indicates that great majority of the respondents (70.83 per cent) were using medium number of sources of information, followed by 17.50 percent of respondents were using low number of sources of information. Only 14 respondents (11.67 per cent) were using sources of information to high extent.

Further,

In case of Economic motivation, it was noticed that nearly three fourth (70.83 per cent) of the beneficiary respondents belonged to medium economic motivation category. Whereas, less than one fifth (14.17 per cent) and more than one tenth (15.00 per cent) of the beneficiaries had low and high economic motivation.

Table I clearly shows that 79.17 per cent of the respondents were having medium risk bearing ability, followed by 10.83 per cent of the respondents were with high risk bearing ability and one tenth (10.00 per cent), respectively.

These findings are consistent with the observations of Hiremath (1993), Sinha (1984), Sharnagat (2008), Pise (2006), Meshram (2006), Ramakrishna (1986), Gopalan (1988).

Awareness of the respondents about National Horticultural Mission

Table 2. Distribution of respondent beneficiaries according to their overall awareness

No.	Category	Respondents	
		Frequency	Per cent
1	Low awareness (less than 22.31 score)	31	25.83
2	Medium awareness (between 22.31 to 23.41 score)	33	27.50
3	High awareness (more than 23.41 score)	56	46.67
Total		120	100.00

Table 2 indicates that most of the respondents (46.67 per cent) were having high level awareness about National Horticultural Mission, followed by 27.50 per cent of respondents were with medium level of awareness. 25.83 per cent of the respondents were having low level of awareness. These results are in agreement with the findings of Ramakrishna (1986) and Gopalan (1988).

Relationship between characteristics of beneficiary and their attitude toward National Horticulture

Mission

From Table 3 it is clear that land holding (0.2614), and extension contact (0.2671), had positive and significant correlation with attitude of beneficiaries towards National Horticulture Mission. The variables like age (0.1254), experience in horticulture (0.1014), Sources of information (0.1554), economic motivation (0.0536), and risk orientation (0.0798), shows non-significant relationship with attitude of beneficiaries towards National Horticulture Mission. While variables like, education (-0.0252), and occupation (-0.1174) had negative and non-significant relationship with attitude of beneficiaries towards National Horticulture Mission.

Table 3. Relationship between the characteristics of beneficiaries and the attitude towards National Horticulture Mission

No.	Independent Variables	Correlation Coefficient ('r' value)
1.	Age	0.1254 ^{NS}
2.	Education	-0.0252 ^{NS}
3.	Occupation	-0.1174 ^{NS}
4.	Land holding	0.2614*
5.	Experience in horticulture	0.1014 ^{NS}
6.	Extension contact	0.2671*
7.	Sources of information	0.1554 ^{NS}
8.	Economic motivation	0.0536 ^{NS}
9.	Risk orientation	0.0798 ^{NS}
10.	Awareness	0.1001 ^{NS}

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FIELD-TESTING OF ANIMATED CLIPPINGS IN TERMS OF PERCEPTION

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ABSTRACT

Animated Clippings can be used to demonstrate specific manual skills or physical processes and they can be used to simplify complex ideas, using media-specific techniques. Overall fog index value of Animated Clippings was 3.418, which indicates that Animated Clippings were having high readability. All the visuals were identified by 85 to 100 percent of respondents. Findings reveal that perception of the visuals were clear, simple and matched with titles.

INTRODUCTION

Rajasthan, India's largest state in terms of land area, has a maternal mortality ratio (MMR) of 445 per 100,000 live births, which is substantially higher than the national figure of 301 (Acc. To RGI). Rajasthan is the state with second highest maternal mortality in India. Approximately total number of deaths of pregnant ladies in Rajasthan in one year is equivalent to total number of deaths of pregnant mothers in five years in Kerala.

The network of government services in India is very large but the quality of these services leaves much to be desired. Although there is a large and thriving private health sector in India, the primary health and reproductive health care needs of the masses, especially in rural areas, are expected to be provided by the public facilities, mostly run by the state governments. In this way media plays an important role as far as the communication of technology or information is concerned. The developed Animated Clippings will help in development of new and correct concepts, to overcome language barriers and individual differences and make learning experience pleasurable, easy and understandable. Thus, the present study was conducted with following specific objectives:

1. To field-test the developed Animated Clippings for its effectiveness in terms of **perception**.

RESEARCH METHODOLOGY

Beechwal village of was selected randomly.

Animated Clippings shown to 20 rural women of Bikaner panchayat samiti who were not included in the sample to investigate. Field testing of prepared Animated Clippings which was done in following manner.

Measurement of readability

Readability means quality of a piece of reading matter that makes it interesting and understandable to those for whom it is written. To find out the readability of written material of Animated Clippings, the data was organized as follows:

- a) Fluency in Reading
- b) Number of Difficult words
- c) Fog Index
- d) Readability Index

Measurement of Perception

To find out visual perception of illustrations used in prepared Animated Clippings, open ended questions were framed. The perception of visuals was tested with the help of open ended questionnaire.

RESULTS AND DISSCUSSION

Field Testing of Animated Clippings in terms of Readability and Perception

Field testing of developed Animated Clippings was done by assessing readability, and perception of 8th pass rural women of Bikaner district.

1. Readability of Animated Clippings

The importance of reading in today's world is

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clearly and universally recognized. Reading deals vertically with information and enhances social and political participation. The target group for which it has been designed can assume readability of Animated Clippings. Readability of Animated Clippings was judged by ability of the target group for which it has been developed. It was measured on following 4 aspects:

Fluency in Reading

Fluency is a smoothness and rapidity in reading of words uninterrupted by failure. Fluency was measured on three point continuum that is fluent, slow and very slow. Information about the level of fluency of each, respondent with their mean weighted score is presented in Table -1. The criteria of fluency in reading category have showed in method and material chapter.

Table 1. Distribution of respondents by their fluency in reading of Animated Clippings with weighted mean score

n=20		
No.	Category	Percentage
1.	Fluent	65.00
2.	Slow	15.00
3.	Very Slow	20.00
Weighted mean score		2.45

Maximum Score = 3

Table 1 shows that majority of respondents (65%) could read Animated Clippings fluently because they all were 8th pass while 20 percent respondents were slow in reading. Only 15 percent of respondent were very slow in reading. The weighted mean score was 2.45 out of maximum score 3. The possible reason for such kind of findings may be that Animated Clippings contained easy and simple words, which could be read by the target group very easily. Instead of this, Animated Clippings were found good in reading as it consist clear illustration with simple language and short words that enhanced the fluency in reading.

Words Perceived as Difficult by Respondents

Efforts were further made to know how many words were found difficult to read by the respondents. The findings related to this aspect are

presented in Table 2.

The data in Table 2 show that the word “*Antiseptic cream*” was found difficult to read by 30 percent respondents while “*Maatritava*” was perceived difficult to read by 25 percent of respondents.

Table 2. Distribution of respondents who perceived the words as difficult to read in Animated Clippings

n=20			
No.	Words perceived difficult	Frequency	%
1.	Maatritava	5	25.00
2.	Carbohydrate	3	15.00
3.	Bhengapan	3	15.00
4.	Budhiheen	2	10.00
5.	Vridhi	1	5.00
6.	Kritim	3	15.00
7.	Antiseptic cream	6	30.00
8.	Galghontu	3	15.00
9.	Tikakaran	1	5.00
10.	Jiwanumukt	3	15.00

Further, findings indicates that the words “*Carbohydrate*”, “*Bhengapan*”, “*Kritim*” “*Galghontu*” and “*Jiwanumukat*” were perceived difficult to read by 15 percent, each. While some words like “*Budhiheen*”, “*Vridhi*” and “*Tikakaran*” were perceived difficult to read by only 10 and 5 percent respondents.

Readability on the Basis of Fog Index Value

To measure the readability of Animated Clippings, fog index value and related information of Animated Clippings have been presented in Table 3 and shows that Animated Clippings had low fog index value in all clippings i.e. 3.863 for C1, 3.162 for C2, 3.508 for C3 and 3.021 for C4. Overall fog index value of Animated Clippings was 3.418, which indicates that Animated Clippings were having high readability.

Gunning (1952) reported that higher fog index indicates lower readability and vice-versa. This might be due to the reason that words comprising fewer letters rather than bulky words. The font size could also be adjusted according to respondents so they

could easily read the matter. The messages were also supported by clear appropriate illustration.

Table 3. Level of readability on the basis of fog index value

Media	No of difficult words	Average respondents pertaining difficult words	Fog index value
C1	4	3.25	3.863
C2	1	1.00	3.162
C3	4	3.25	3.508
C4	1	3.00	3.021
Overall		10	3.418

Readability Index of Animated Clippings

Readability index was calculated to determine the reading skill of target group. The readability index was measured on 3 point continuum i.e. easy, average and difficult to read by assigning scores 3,2,1, respectively. Table 4 gives information regarding readability index of the respondents for Animated Clippings.

Table 4 portrays that majority of the respondents (80%) reported that Animated Clippings were easy to read. The possible reason could be that the language was very easy to understand. The words included in Animated Clippings were related to their day-to-day life. Moreover, illustrations enabled to catch hold the meaning of messages.

Table 4. Distribution of respondents by their readability index in Animated Clippings

No.	Category	Frequency	%
1.	Easy	16	80.00
2.	Average	2	10.00
3.	Difficult	2	10.00
Weighted mean score		2.74	

Table further depicts that very few (10%, each) found to be average and difficult Animated Clippings because of their low level of understanding. The weighted mean score of readability index of Animated Clippings was 2.74 out of maximum score of 3. Thus,

it might be inferred that Animated Clippings were easy in reading.

On the basis of above findings, it may be deduced that the readability of Animated Clippings was very good as it had low fog index value and was fluent in reading, had few words perceived as difficult to read by very small number of the respondents and had high readability index value.

Perception of the Visuals

In entire Animated Clippings, main visuals enlists were 60. The findings in terms of visual perception are presented for each illustration in Table 5.

Data presented in Table reveals that all the illustrations of Animated Clippings were identified by 85 to 100 percent of the respondents. Findings reveal that perception of the visuals were clear, simple and matched with titles.

Overall Perception of the Visuals

An overview of Table 6 reveals that the mean score obtained by the respondents for comprehension of illustrations Animated Clippings was 59.40 out of 60 scores.

This indicates that perception of the visuals of Animated Clippings was good as it was nearer to maximum score. Table depicts that majority of respondents (55%) were 'above mean score' followed by 45 percent of the respondents who were 'below mean score' in case of perception of visuals in Animated Clippings. This might be due to mass media exposure like T.V. and also participation in the welfare programme.

In support to the present findings Goswami (2009) also conducted study and reported that overall comprehension of the Website and Booklet in terms of the title, key messages and illustration was excellent as majority of respondents were 'above mean score' followed by 'below mean score'.

CONCLUSION

It could therefore, be concluded that overall readability and perception of the Animated Clippings was excellent as majority of respondents were 'above mean score' followed by 'below mean score'. The possible reason for good readability was that

Table 5. Distribution of respondents by visual perception of Animated Clippings**n=20**

S.No.	Visuals	Description of visuals	Frequency	%
1.	Clipping 1. A Village	Village scene	20	100.00
2.	Four ladies and a nurse	Rural pregnant woman and nurse	20	100.00
3.	Five ladies in front of building	Five rural ladies in front of Anganbadi building	20	100.00
4.	Nurse and board	Lecture with rural women	20	100.00
5.	Rural woman having food	Rural pregnant woman having food	20	100.00
6.	Two rural ladies having food	One normal and one pregnant woman having food	20	100.00
7.	Bowls	Bowls of wheat, rice, maize	20	100.00
8.	Plate	4 types of pulses in plate	20	100.00
9.	Eatables	Fruit and vegetables	20	100.00
10.	Eatables	Green leafy vegetable	20	100.00
11.	Food products	Milk and Milk products	20	100.00
12.	Food products	Ghee, Gur, Sugar, Oil	20	100.00
13.	A lady doing walk	Pregnant lady doing walk	20	100.00
14.	Bowl	Salt bowl	20	100.00
15.	Two Child	Sequent and mentally retarded	19	95.00
16.	Prohibited things	Brick, Sand, Gutka, Bidi, Alcohol	18	90.00
17.	Rural woman having food	Rural pregnant woman having food	20	100.00
18.	A lady	A sick pregnant lady	20	100.00
19.	Child	Risky child	20	100.00
20.	Board and nurse	Nurse indicating slogan on board	20	100.00
21.	Clipping 2 A lady	A pregnant lady	20	100.00
22.	4 ladies	4 rural women in PHC	20	100.00
23.	Stages of child development	9 months growth of child	19	95.00
24.	Stages of pregnancy	9 months of pregnancy	20	100.00
25.	Nurse and pregnant lady	Nurse injecting injection	20	100.00
26.	Nurse, weighing machine, pregnant lady	Nurse measuring weight of pregnant lady	20	100.00
27.	B.P. instrument, Pregnant lady, Nurse	Nurse measuring B.P. of pregnant lady	20	100.00
28.	Lady	Pregnant woman having tablets	18	90.00
29.	Rural woman having rest	Pregnant lady having rest	20	100.00
30.	Rural woman cleaning the floor	Pregnant lady cleaning the floor	20	100.00
31.	Rural woman doing walk	Pregnant lady doing walk	20	100.00

32.	Rural woman with bucket	Pregnant lady with bucket	20	100.00
33.	Pregnant lady and Nurse	Nurse doing check up of pregnant woman	20	100.00
34.	Clipping 3A lady	Mother	20	100.00
35.	A child	Cleaning of child	20	100.00
36.	A child	Pat the back of child	20	100.00
37.	A doctor and a child	Doctor giving artificial respiration to child	17	85.00
38.	Cream	Antiseptic cream	20	100.00
39.	Child	Risky child	20	100.00
40.	Hand wash	Washing hands	20	100.00
41.	A child	Cleaning of child	20	100.00
42.	A child	Child wrapped in cotton	20	100.00
43.	Lactating mother with child	Feeding of child	20	100.00
44.	Weighing machine and child	Routine check-up	17	85.00
45.	Spoon feeding	Mother feed the child with spoon	20	100.00
46.	A child	Child having rest	20	100.00
47.	Nurse and lady	Nurse and mother having conversation	20	100.00
48.	Medicine	Injection	20	100.00
49.	Medicine	B.C.G vaccine	20	100.00
50.	Boy	Boy having polio	20	100.00
51.	Medicine	Child having polio drops	20	100.00
52.	Clipping 4A lady	A lactating mother	20	100.00
53.	Lactating mother with child	Feeding of child	20	100.00
54.	Child	Child having loose motion	20	100.00
55.	Child	Child having cough and cold	20	100.00
56.	Baby feed	Bottle of Ghutti	20	100.00
57.	Baby feed	Bottle of Honey	20	100.00
58.	Lactating mother with child	Worping of child	20	100.00
59.	Cow and spoon feeding of child	Mother spoon feed the child	20	100.00
60.	Nurse and lady	Nurse and lactating mother having conversations	20	100.00

Table 6. Percentage distribution of respondents by overall mean score of Perception of Animated Clippings

Media	Score Range	Mean Score Obtained	n=20			
			Respondents Below Mean Score		Respondents Above Mean Score	
			Frequency	Percentage	Frequency	Percentage
Animated Clippings	57-60	59.40	9	45.00	11	55.00

Animated Clippings contained easy and simple words, which could be read by the target group very easily and clear illustration with simple language and short words that enhanced the fluency in reading. The content was organized in proper sequence and unnecessary details were avoided in Animated Clippings. The font size could also be adjusted according to respondents so they were easily read the matter. The messages were also supported by clear appropriate illustration. For clarity of content, local, simple and familiar words were used to deliver the message to the rural women that might help them in reading the messages clearly. Perception of the visuals of Animated Clippings was good this might be due to mass media exposure like T.V. and also participation in the welfare programmes and visuals were clear, simple and matched with titles.

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SCREEN PRINTING WORKERS OF RAJASTHAN: A STUDY

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ABSTRACT

India, since ancient times is known for its unique arts and crafts. One of the earliest techniques used to colour fabric was printing with a screen printing. One of the most popular form of hand printing is - Screen printing. Printing is the process of applying colour to fabric in definite patterns or designs. It is also known as localized application of dye or pigment in thickened form to a substrate to create an attractive design with well defined boundaries. The objective of present study is to find out about the dyes, binders, thickeners used by screen printers and physical problems faced by them. For this purpose thirty respondents were purposively selected from Udaipur, Jaipur and Barmer district and structured interview schedule was used for data collection. The results reveals that majority of the respondents were using the synthetic dyes and thickeners and facing the health problems related to skin followed by breathing and back ache.

INTRODUCTION

Textile printing of colored design on the fabric is an ancient art. Textile printing is one of the oldest handicrafts. The intrinsic beauty of textile is enhanced by surface ornamentation with multi colored effect. This ornamentation in fabric can be achieved by various methods of which dyeing & printing are the most popular and are more extensively used. Textile printing is the production of attractive design with well defined boundaries made of the artistic arrangement of a motif in one or more colour. Printing of textile is simplest and often and also the cheapest method of producing multi coloured design. The design is produced by local application of dye hence; it is independent of style making fabric. The most common approach of applying colour pattern in direct printing style dye is applied to the fabric in paste form with the help of block; screen or roller printing. Screen printing on fabric is a wonderful way to improve the look of fabric and to make any sort of pattern that suits our needs. Screen printing was originated in 1907. Screen printing is a manual method of applying color locally, fundamentally it is stenciling. It is a most widely practiced method of hand printing. Screen printing is done after weaving. The screen printing process has multiple steps, starting with the process of creating the screen. The objective of present study was to study process, thickeners and dyes used for screen printing and to

find out the physical problems faced by the printers.

RESEARCH METHODOLOGY

The present study was conducted in Udaipur, Jaipur and Barmer district. Thirty Craftsmen were purposively selected for the present study. These were working with screen printing from last ten to fifteen years. A structured questionnaire and interview method was used to generate information on self-reported problems faced by him. Critical examination of work place was also done to know about the work environment. Data were analyzed using frequency and percentage.

Personal profile of the screen printing workers

Data in table show that slightly more than half of the respondents (56.7%) were in age group of 31-40 years, as far as caste, 43.33 per cent of them were from general category. Regarding family structure majority of them were from nuclear family (66,67%). Further, 80 per cent of respondents had medium family size, 20 per cent of respondents had small family and none of the respondents had large family. Sixty per cent were educated up to higher Secondary, 60 per cent respondents monthly income ranged between Rs. 5000-10,000 per month and 30 per cent earned more than Rs 10,000-20000 per month. Sixty per cent of the respondents were doing screen printing as their family occupation and 30 per cent respondents were also doing service along with screen printing.

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Regarding the approximate time spent for doing screen printing it was found that 60 % respondents spent 8-10 hour in a day and 40 per cent respondents work 7-8 hour per day with screens.

Specific Information

Table 2 shows that 70 per cent respondents used chemical color and rest 30 per cent respondents used natural as well as synthetic color for screen printing. Reasons for less use of natural dye for

screen printing were laborious process of preparation, difficulty in obtaining same shade and time consuming process. Due to easy availability increased number of fast and luminous chemical dyes. While some of the colours that are not possible to produce by natural means, were produced through the synthetic dyes. Reasons reported for the use of synthetic dyes are due to convenience of use and diversity of colours.

Table 1. Personal profile of the respondents

n=30

S. No.	Aspects	Categories	No of Respondents	
			Frequency	Percentage
1	Age (in years)	31-40	17	56.7
		41-50	13	43.33
2	Caste	SC/ST	08	26.67
		Backward OBC)	09	30
		General	13	43.33
3	Family Type	Nuclear	20	66.67
		Joint	10	33.33
	Family Size	Small (up to 4 members)	06	20
		Medium (5-8 members)	24	80
4	Education	up to Primary	-	-
		up to Middle	-	-
		up to metric	12	40
		Higher secondary	18	60
5	Monthly Income (Rs.)	up to 5000	03	10
		5000-10000	18	60
		10000-20000	09	30
6	Family occupation	Printing	18	60
		Farming	03	10
		Services	09	30
7	Duration (hrs/day)	8-10hours	18	60
		6-8 hours	12	40

Table 2. Dye used by the respondents

n=30		
Dyes used	Frequency	Percentage
Synthetic (chemical)	21	70
Natural + Synthetic	09	30

Various classes of dyes are used in screen printing. The choice of the dye depends on the kind of the fabric used. Reactive and vat dye is used for cellulosic.

Type of thickening agents used for the printing at your unit

Thickening agent is necessary for the printing paste because it makes thick to the printing paste, so that when applied on fabric it does not spread. When printing completed thickening agent is removed for better appearance.

Table 3. Type of thickening agents used by the respondents

n=30		
Thickening Agent	Frequency	Percentage
Gum Acacia	-	-
Guar Gum	03	10
Tamarind	03	10
Rice Starch	-	-
Synthetic Binders (Poly Vinyl Alcohol)	30	100

Table clearly shows that hundred per cent respondents used Synthetic binders, 10 percent respondents used Guar gum and Tamarind powder for the printing and none of the respondents used Gum acacia and rice starch as thickening agents. Reasons for using synthetic binders is easy availability and could be reused next day but natural thickening agents needs to be prepared daily and cannot be reused on another day.

Mode of procurement thickening agents for printing

The data regarding mode of procurement of thickening agent has been depicted in table. It was found half of the respondents procured thickening agent from chemical firms, while 30 per cent

respondents got these from local market and 20 per cent respondents prepared it at own shop.

Table 4. Mode of procurement of thickening agents

n=30			
No.	Place	Frequency	Percentage
1	Local market	09	30
2	Own preparation	06	20
3	Chemical firms	15	50
4	Textile auxiliary firms	-	-

Assessment of the color fastness of the printed samples

Table 5. Assessment of the color fastness

n=30		
Technique	Frequency	Percentage
Washing	15	50
Rubbing	08	26.67
Sun light	15	50
Perspiration	-	-

Table shows that half of the respondents used to check the washing and sunlight fastness to assess the colorfastness of the printed fabric. None of the respondents checked fastness towards perspiration.

Health Problems faced by the respondents

The researcher tried to identify the health problems faced by respondents. 66.67 per cent respondents revealed that problem of itching, cracks in skin and dry skin while repeatedly working with chemical colors. 40 per cent respondents faced nausea and breathing problem. Other problems were back pain (26.67%) may be due to working in same posture for long duration and eye irritation (10%). It was also observed during informal discussion that after doing screen printing respondents takes the break and wash the hand with sprit or kerosene which may be one of the reason for dry skin and cracks in the skin.

Information about the use of protective clothing and accessories used was also collected and it was found that none of the respondents were using the

apron, hand gloves or mask for protection.

Table 6. Distribution of the respondents on the basis of Problems faced by them
(n=30)

No. Physical Problem	Respondents	
	Frequency	Percentage
1. Eye irritation	03	10
2. Itching	20	66.67
3. Cracks in skin	20	66.67
4. Dry skin	20	66.67
5. Back pain	08	26.67
6. Nausea	12	40
7. Breathing problem	12	40

CONCLUSION

The results highlighted the fact that majority of screen printers were using synthetic dye and thickeners. Very few were using the natural dyes and binders. Natural dyes and binders were used to fulfill

the export orders only. Results further reveals that due to faulty posture while working in the printing units workers without the use of protective clothing resulted in various types of physical health hazards. The major problems faced by the workers related to skin itching, cracks in skin and dry skin to the exposure of chemicals. Hence to need arise to generate awareness of common health hazards among screen printers to take precautions and safety measures at work place.

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SOCIO-ECONOMIC STATUS OF SERICULTURISTS OF CHHATTISGARH

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ABSTRACT

The study is based on 270 sericulturists drawn by simple random sampling method from 18 villages which had more sericulturists selected from six purposely selected blocks (i.e. Sarangarh, Baramkela and Gharghoda blocks from Raigarh district and Korba, Kartala and Podi Uparoda blocks from Korba District) from both the districts. The study revealed that the majority of respondents were belonged to middle age group, illiterate and belonged to schedule tribes, living in a nuclear family with family size up to five members and had farming experience up to 15 years with membership of one organization. Cent per cent respondents were performing tasar silk cultivation, however majority of them were also engaged in subsidiary occupation to support their livelihood. Majority of the respondents were landless (70%) and involved in other occupation in addition to tasar silk cultivation and the surviving with their medium annual income. Majority of the respondents (91.11%) reported that credit for tasar silk cultivation is not available. 96.67 per cent preferred silkworm rearing because govt. should provide facilities in free of cost i.e. land and other equipments.

INTRODUCTION

Asia is the major producer of silk in the world and it produces over 98.5 per cent of global output. Although there are more than 40 countries on the world silk map, bulk of its production comes from China and India, followed by Brazil, Uzbekistan, Thailand, Vietnam, Korea and Japan etc. (Bhat, 2014). The total world raw silk production during 2012-13 was about 1, 31,479 MT. China leads with a total silk production of 1, 04,000 MT (79.10%) while India stands second with 23,679 MT (17.54%) in the global silk production. It is this position, as one of only two major silk producers in the world, and from its employment potential, that sericulture and silk derive their importance in the Indian textile map. India is also the largest consumer of silk consuming around 28,733 MT.

Tasar Silk is copper brownish in colour and is slightly coarse in texture. Which mainly leaves of Oak, Asan and Arjuna trees. Tasar silk is mainly produced in Jharkhand, Chhattisgarh, Bihar, Madhya Pradesh, Orissa and West Bengal & Andhra Pradesh. As regards Tasar silk production Jharkhand ranked first with its contribution of 403.70 MT's followed by Chhattisgarh (161.00MT's) and Madhya Pradesh (74.00 MT's). While Assam retained its first position

in Eri silk production with 1410 MT's followed by Meghalaya (450 MT's) and Manipur (280 MT's) (Giridhar *et al.*, 2010).

The State of Chhattisgarh, the Sericulture Sector of DORI has 14,333 ha of planted area of Saja and Arjuna, 5,228 ha in departmental farms, 5,178 ha in forest area and 3,927 ha under sericulture project planted area is available out of which 3,220 ha in departmental farms, 4,165 ha in forest area and 3,955 ha under sericulture project effective planted area is available. 129 departmental farms and 152 sites under Seri project are established in different districts of the state. During the year 2011-12, under natural seed multiplication & collection program, were collected by 22, 32,158 beneficiaries. 22, 23, 28,225 lakh total tasar cocoons were collected by 22, 32,158 beneficiaries (Anonymous, 2012).

Sericulture play very effective role in the utilization of the natural resources in a most effective manner for socio-economic upliftment with livelihood, employment and income generation (Malik *et al.*, 2008) Sericulture is a potential sector of the agriculture to raise economic status of the farming community and also earning foreign revenue (Thapa and Shrestha, 1999). Sericulture is an integral part of tribal life, practiced by about 1.5 lakh tribal

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populace in the states of Jharkhand, Chhattisgarh, Orissa, Madhya Pradesh, Utter Pradesh, West Bengal, Bihar, Maharashtra and Andhra Pradesh (Shetty *et al.*, 2007).

In this context sericulture is a labour intensive industry. It provides direct or indirect employment to about 6 million people in India. Sericulture requires low investment and offers high profit. It also provides regular income to farmers throughout the year unlike most other agricultural crops. Sericulture plays a vital role in the flow of income from the urban rich sections of the society to the rural poor, as demand for silk is largely from the higher income group (Dewangan *et al.*, 2011).

Keeping in above facts view, the present study was undertaken to determine the socio-economic profile of sericulturists and their opinion towards the adoption of improved tasar silkworm rearing.

RESEARCH METHODOLOGY

The present investigation was carried out in Raigarh and Korba Districts of Chhattisgarh during 2012-13. From the each selected district, 3 blocks (3X2 = 6) were selected purposely for the study. In this way Sarangarh, Baramkela and Gharghoda blocks from Raigarh district and Korba, Kartala and Podi Uparoda blocks from Korba district were considered for this study because they had the highest area covered under tasar silk cultivation. From each selected block, 3 villages (Total 3 X 6 = 18) were selected on the basis of maximum availability of beneficiaries in the villages. Only those farmers who were practicing tasar silk cultivation were considered as respondent for this study. From each selected village, 15 sericulturists were selected randomly from the village level list of tasar cultivators. In this way a total of 270 tasar silk producing farmers were considered as respondent for the present study.

The primary data were collected through personal interview with help of pre-tested structured interview schedule and analyze by using the statistics techniques were applied in the form of frequency and percentage etc.

RESULTS AND DISCUSSION

Socio-personal characteristics of the respondents

Age, education, caste, type of family, size of family, experience in sericulture and social participation of sericulturist family members in tasar silk cultivation were considered as socio-personal characteristics of the respondents. These characteristics were analyzed and presented in Table 1.

Table 1: Distribution of the respondents according to their socio-personal characteristics

(n=270)		
Characteristics	Frequency	%
Age		
• Young (up to 35 years)	82	30.37
• Middle (36 to 50 years)	160	59.26
• Old (above 50 years)	28	10.37
Education		
• Illiterate	118	43.70
• Primary School (up to 5 th class)	98	36.30
• Middle School (6 th to 8 th class)	39	14.45
• High School (9 th to 10 th class)	11	04.07
• Higher Secondary School (11 th to 12 th class)	03	01.11
• Above Higher Secondary School (above 12 th class)	01	00.37
Caste		
• Scheduled Caste	28	10.37
• Scheduled Tribes	165	61.11
• Other Backward Class	77	28.52
• General	00	00.00
Type of family		
• Nuclear	156	57.78
• Joint	114	42.22
Size of family		
• Small (up to 5 members)	149	55.19
• Medium (6 to 10 members)	109	40.37
• Large (above 10 members)	12	04.44
Experience in sericulture		
• Up to 15 years	188	69.63
• 16 to 30 years	77	28.52
• Above 30 years	05	01.85
Social participation		
• No membership	114	42.22
• Membership with one organisation	146	54.08
• Membership with more than one organisation	00	00.00
• Office bearer of organization	10	03.70

Age of the respondents

The findings on age of the respondents are presented in Table 1. The data reveal that the most of the respondents (59.26%) belonged to the middle age group (between 36 to 50 years). However, 30.37 per cent of the respondents were of young age group (up to the age of 35 years). Whereas, in the older age group the percentage of sericulturist was only 10.37. The findings indicated that the maximum number of the respondents in the study area belonged to the middle age groups, followed by young age group and older age group. This reflected that old people were not much involved in the tasar silk cultivation.

Education of the respondents

About education, the data reveal that the majority (43.70%) of selected sericulturist were illiterate. However, 36.30 per cent of selected sericulturist had primary school level of education, followed by 14.45 per cent middle school passed, 4.07 per cent high school passed, 1.11 per cent passed higher secondary school and only 0.37 per cent respondents had passed above higher secondary school. As the rural people are still traditional based they generally prefer their children to assist them in farm and household activities rather than to go school or college. This distance between the higher study centers and the villages might have prevented from providing higher education to their children.

Caste of the respondents

The data presented on caste of the respondents in Table 1 indicates that the majority of the respondents (61.11%) of the selected sericulturist belonged to Scheduled tribes, followed by 28.52 per cent of the respondents belonging to Other Backward Class and only 10.37 per cent of the respondents belonged to scheduled caste. None of the respondents belonged to general category. The findings in the study area revealed that only scheduled tribe, other backward class and scheduled caste were engaged in tasar silk worm rearing and it was not preferred by the general category because they did not consider it a good occupation

Type of family

The data regarding type of family (Table 1) shows that the 57.78 per cent of the respondents were having

nuclear type of family, followed by 42.22 per cent were having joint family. Pandit *et al.* (2007) and Sahu (2011) noted similar findings in their study.

Size of family

The data regarding size of family (Table 1) indicates that the 55.19 per cent of the respondents were having small size of family (up to 5 members), followed by 40.37 per cent of respondents had medium size of family (6 to 10 members) and only 4.44 per cent of the respondents had big size of family (above 10 members).

Experience in sericulture

The data regarding experience of sericulture is presented in Table 1. The findings revealed that majority of the respondents (69.63%) had experience in sericulture up to 15 years, followed by 28.52 per cent had 16 to 30 years of experience and only 1.85 per cent of the respondents had above 30 years of experience.

Social participation

The data regarding social participation (Table 1) shows that the maximum number of the respondents (54.08%) were member of one organization, followed by 42.22 per cent had no social participation. While, only 3.70 per cent of the respondents were office bearer of organization. None of the respondents falls in the category of member of more than one organization.

Socio-economic characteristics of the respondents

The independent variables i.e. occupation, land holding, annual income and credit availability were considered as socio-economic characteristics of the respondents.

Occupation of respondents

The distribution of the respondents according to their involvement in different occupation is given in the Table 2. The data also reveals that the 100 per cent of the respondents were involved in tasar silk cultivation, 96.66 per cent of the respondents were also involved in other labour work like MNREGA etc. However, 82.96 per cent of sericulturist involved in agriculture labour work, followed by 75.55 per cent of sericulturist involved in collecting small forest

products, 25.55 per cent sericulturist involved agriculture and 15.92 per cent of sericulturist involved in animal husbandry, 12.59 per cent involved in poultry. While, 1.48 per cent of the sericulturists were involved in other occupation like business, service carpenter, etc. The similar results were also reported by Aiyaswamy (1980).

As regards to involvement in occupation, majority (82.97%) of the sericulturists were involved in more than three occupations followed by involved in 2 to 3 occupations (13.70%). While, only 3.33 per cent of the sericulturists were involved one occupation.

Land holding of respondents

The distribution of the respondents according to their size of land holdings are presented in the Table 2. The data regarding land holdings indicates that of the total, 70 per cent of the selected sericulturists were landless farmers, followed by 22.60 per cent of the respondents had up to 1 ha of land holdings (Marginal farmers), 6.29 per cent had 1.1 to 2 ha of land holdings (Small farmers), while only 1.11 per cent of the sericulturist had 2.1 to 4 ha of land holdings (Medium farmers). None of the respondents in the study area were having more than 4 ha land.

The data regarding extent of irrigation availability and sources of irrigation at the sericultural fields shows in Fig. 1 and 2. The findings reveal that the majority of the respondents (88.51%) reported that irrigation facilities are not available. However, 7.77 per cent of the respondents reported that irrigation is available for their less than 25 per cent land holding, followed by 1.49 per cent each had irrigation facility between 25.10 to 50 per cent area and 50.10 to 75 per cent land holding, while, only 00.74 per cent of the respondents had large level (above 75%) of irrigation availability.

As regards to irrigation sources, 48.39 per cent of the respondents had tube well/ hand pump as a source of irrigation, followed by 35.48 per cent of the respondents had canal as a source of irrigation and 9.68 per cent of the respondents had other sources of irrigation like well and river etc., while only 6.45 per cent of the respondents had pond as a source of irrigation.

Table 2: Distribution of the respondents according to their socio-economic characteristics

(n=270)

Particulars	Frequency	%
Occupations*		
• Sericulture	270	100.00
• Sericulture + Agriculture	69	25.55
• Sericulture + Agriculture labour	224	82.96
• Sericulture + Other labour	261	96.66
• Sericulture + Animal husbandry	43	15.92
• Sericulture + Poultry/ Fisheries	34	12.59
• Sericulture + Collection of small forest product	204	75.55
• Sericulture + Others (Business/ service/ carpenter, etc.)	04	01.48
Involvement in number of occupation		
• Involved in one occupation	09	03.33
• Involved in 2 to 3 occupations	37	13.70
• Involved in more than 3 occupations	224	82.97
Size of land holding (Other than sericulture)		
• Landless farmer	189	70.00
• Marginal (up to 1ha)	61	22.60
• Small (1.1 to 2 ha)	17	06.29
• Medium (2.1 to 4 ha)	03	01.11
• Large (above 4 ha)	00	00.00
Annual income (in Rs.)		
• Low (up to Rs. 30,000)	65	24.08
• Medium (Rs. 30,001 to Rs. 60,000)	190	70.37
• High (Rs.60,001 to Rs. 90,000)	13	04.81
• Very high (> Rs. 90,000)	02	00.74
Credit availability		
• Not available	246	91.11
• Available	24	08.89

*Data are based on multiple responses

Annual income of respondents from all the sources

The distribution of the respondents according to their annual income from all the sources is presented

in Table 2. As regards to annual income, the majority of the respondents (70.37%) were having their income, in the range of Rs. 30,001 to Rs. 60,000 followed by 24.08 per cent of respondents had their annual income less than Rs. 30,000, 4.81 per cent of respondents had their annual income in the range between Rs. 60,001 to Rs. 90,000, while, only 00.74 per cent of the respondents had obtained income more than Rs. 90,000.

Credit availability for respondents

The findings regarding credit availability are presented in the Table 2. It is clear from this table that the majority of the respondents (91.11%) reported that credit for tasar silk cultivation is not available, while, only 8.89 per cent of the respondents had said credit for tasar silk cultivation is available. Mallikarjuna *et al.* (2001) reported that non-availability of credit to the sericultural enterprise in Mysore district of Karnataka.

Reason for continuing sericulture cultivation

The data revealed that the out of total 270 sericulturists, 96.67 per cent preferred silkworm rearing because govt. should provide facilities in free of cost i.e. land and other equipments (Table 3). About 89.63 and 85.18 per cent of the sericulturists prefer silkworm rearing due to lack of other occupation and no need to spent own money, respectively. About 83.33 per cent sericulturists prefer silkworm rearing because it is easy practice, 79.63 per cent of the sericulturists prefer silkworm rearing for livelihood, 76.29 per cent of the sericulturists prefer silkworm rearing due to unavailability of land for agriculture and 75.92 per cent of the sericulturists prefer silkworm rearing to improve economic condition of family.

About 62.96 per cent of the sericulturists preferred silkworm rearing to fulfil family requirements, 50.37 per cent of the sericulturists chosen silkworm rearing because dead branches of host plants were used as fuel purpose, 45.18 per cent of the sericulturists prefer silkworm rearing because it generate assured income, 43.33 per cent of sericulturists prefer silkworm rearing because it is not required extra care, 41.85 per cent of sericulturists prefer silkworm rearing because it takes very less time for production, 34.44 per cent of sericulturists prefer silkworm rearing because it gives maximum benefits than other occupation, 24.44 per

cent of sericulturists prefer silkworm rearing for the education of children, while only 14.81 per cent of the sericulturists gave reason to prefer silkworm rearing it requires low cost for production.

Table 3: Reason given by the respondents for continuing sericulture cultivation (n=270)

Reason	Frequency*	%	Rank
• For livelihood	215	79.63	V
• Generate assured income	122	45.18	X
• Unavailability of own agricultural land	206	76.29	VI
• It takes very less time for production	113	41.85	XII
• Govt. should provide facilities in free of cost i.e. land and other equipments	261	96.67	I
• Utilisation of dead branches host plant (Arjun and Assan) wood for fuel purpose	136	50.37	IX
• It gives maximum benefits than other occupation	93	34.44	XIII
• It required low cost for production	40	14.81	XV
• Silkworm rearing is very easy	225	83.33	IV
• To fulfil family requirement	170	62.96	VIII
• Lack of other occupation	242	89.63	II
• Silkworm rearing not need extra care	117	43.33	XI
• No need to spent own money	230	85.18	III
• For the education of children	66	24.44	XIV
• To improve economic condition	205	75.92	VII

*Data based on multiple responses

CONCLUSION

From the above findings it can be concluded that most of the respondents in the study area belonged to schedule tribes, illiterate and were between 36 to 50 years age. They had nuclear type and small size of

family having up to 15 years of experience in silkworm rearing and had membership in one organisation. Cent per cent of the respondents were performing silkworm rearing, however majority of them were also engaged in subsidiary occupation to support their livelihood. Majority of the respondents were landless and having medium annual earnings. In the study area majority of the respondents were not acquainted with credit facility extended by government organization. Majority of the sericulturists preferred silkworm rearing because govt. should provide facilities in free of cost i.e. land and other equipments, lack of other occupation and no need to spent own money, respectively.

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IMPACT OF FRONT LINE DEMONSTRATIONS (FLDs) ORGANIZED BY KRISHI VIGYAN KENDRA, ROHA

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ABSTRACT

The present study was conducted in Raigad district of Maharashtra. Total, 120 groundnut growers were selected as sample of respondents. The results indicated that the overall impact was 77.00 per cent of front line demonstrations on yield of groundnut. It was also seen that the overall adoption level of groundnut production technology was increased by 81.33 per cent due to FLDs organized by KVK, Roha.

INTRODUCTION

The mandate of KVK is to plan and carry out Front Line Demonstrations (FLDs). Through FLDs, KVK demonstrated the flagship technologies on farmer's field to enhance to productivity and profitability of principle crops grown in the district. It is, therefore, KVK should know that to what extent the productivity of these crops are raised due to demonstrations, to what extent demonstrations helped for adoption of technologies by the farmers. KVK, Raigad conducted several FLDs of ground nut in the district from 2006-07. With this background, present study was undertaken to assess the impact of Font Line Demonstration (FLDs) organized by KVK, Roha with following specific objectives.

- 1 To study the impact of Front Line Demonstrations (FLDs) on yield enhancement of ground nut.
- 2 To study the impact of Front Line Demonstrations (FLDs) on adoption of technology.
- 3 To study the extent of horizontal spread due to Front Line Demonstrations.

RESEARCH METHODOLOGY

The present study was conducted in Mahad, Mangaon, Poladpur and Roha tahsils of Raigad district as KVK, Roah has organized FLDs on ground nut crops in the area.

The yield data of FLD was already maintained by KVK was used to assess the impact on yield. However, data about adoption of technologies,

constraints and suggestions were collected from the farmers. Data were collected, tabulated and analyzed with suitable statistical methods. The statistical tools namely percentages, frequencies etc. were used. Personal interview method was used for data collection and the secondary data was also used. For present study the sample FLD groundnut growers from four tahsils were selected. Thus, in all 120 ground nut growers were interviewed.

Impact Assessment

The impact of FLDs on yield was worked out with formula given below.

$$\text{Impact on yield (\% change)} = \frac{\text{Yield of demonstrated plot} - \text{Yield of control plot}}{\text{Yield of control plot}} \times 100$$

The impact on Adoption of technology was calculated with following formula.

$$\text{Impact on Adoption (\% change)} = \frac{\text{No. of adopter after demonstrated} - \text{No. of adopter before demonstration}}{\text{No. of adopter before demonstration}} \times 100$$

$$\text{Impact on horizontal spread in groundnut area (\% change)} = \frac{\text{After FLD (ha)} - \text{Before FLD (ha)}}{\text{Before FLD (ha)}} \times 100$$

RESULTS AND DISCUSSION

The results of present investigation are given hereunder.

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1. Impact of Front Line Demonstrations (FLDs) on Yield

The findings of impact of Front Line Demonstrations (FLDs) on yield enhancement of ground nut are presented in Table 1.

It is evident from Table 1 that the pod yield of demonstration plot of groundnut was 20.50 q/ha (2009-10), 32.10 q/ha (2010-11), 33.50 q/ha (2011-12), 21.00 q/ha (2012-13) and 22.40 q/ha in 2013-14. This showed that there was significant raise in yield of groundnut over the control by 14.50 %, 14.72 %, 14.51%, 14.72% and 14.28 % for the year 2009-10, 2010-11, 2011-12, 2012-13-10 and 2013-14, respectively. The overall impact was 77.40 per cent. It is seen that in the year 2010-11 and 2011-12 the impact on yield was higher. It was due the plastic mulching technology. Hence, by using the various technologies intervention the yield was increased especially in combination with plastic mulching.

The yield level of control plot was low due to use of low yielding local varieties, improper fertilizers and improper plant population measures. However, in case

of demonstration plot, the factors leads to enhance the yield of crop were timely sowing, use of recommended varieties, balanced nutrient management, earthing up seed treatment and plastic mulching.

2. Impact of Front Line Demonstrations (FLDs) on Adoption of Groundnut Production Technology

Data about adoption of production technology of groundnut by the farmers is depicted in Table 2.

It was found that the highest impact index of the technologies were drum rolling during peg formation stage' (231 %) followed by 'fertilizer management' (111 %), 'earthing up operation 30 DAS' (107%), 'weed management' (97%), 'seed treatment + Rhizobium, PSB & *Trichoderma*' (69 %), 'recommended Varieties (60 %), 'land preparation and application of FYM' (21 %), 'Seed rate' (21 %) and Sowing time and spacing' (15 %). The overall adoption level of groundnut production technology was increased by 81.33 percent due to FLDs organized by KVK, Roha. It is seen that impact of FLD on adoption was remarkable.

Table 1. Impact of Front Line Demonstrations (FLDs) on Yield of Groundnut Crop

Year	Technology Interventions	Number of Farmers	Demonstrated Area (Ha)	Average Yield (q/ha)		Impact (%) Change)
				Control Plot	Demonstration Plot	
2009-10	TG -26 + Seed treatment + Rhizobium, PSB & Trichoderma + Earthing up operation after one month + drum rolling	14	6.00	14.50	20.50	41.00
2010-11	Konkan Gaurav Variety + Seed treatment + Rhizobium, PSB & Trichoderma before sowing + Plastic mulching	30	18.00	14.72	32.10	118.00
2011-12	Konkan Gaurav Variety + Seed treatment + Rhizobium, PSB & Trichoderma before sowing + Plastic mulching	22	15.00	14.51	33.50	130.00
2012-13	Konkan Trombay Tapora + Seed treatment + Rhizobium, PSB & Trichoderma before sowing + drum rolling	34	42.00	14.72	21.00	42.00
2013-14	Konkan Trombay Tapora + fertilizer application 25 : 50 Earthing up operation after one month	20	9.00	14.28	22.40	56.00
Total		120	90	14.55	25.90	77.40

Table 2. Impact of Front Line Demonstrations (FLDs) on Adoption of Groundnut Production Technology

No.	Technology	Number of Adopters (N=120)		Change in No. of Adopter	Impact (% Change)
		Before Demo	After Demo		
1	Land preparation and application of FYM	75	91	16	21.00
2	Recommended Varieties (Konkan Gaurav, Konkan Tapora, TG-26)	43	69	26	60.00
3	Seed rate (100-120 Kg/ha)	80	97	17	21.00
4	Seed treatment + Rhizobium, PSB & <i>Trochoderma</i>	42	71	29	69.00
5	Sowing time and spacing (30×15 cm)	51	59	8	15.00
6	Fertilizer management (25:50:00)	42	89	47	111.00
7	Weed management	36	71	35	97.00
8	Earthing up operation 30 DAS	40	83	43	107.00
9	Drum rolling during peg formation stage	16	53	37	231.00
Overall Impact					81.33

3. Impact of Front Line Demonstrations (FLDs) on Varietal Replacement

The impact of FLDs on varietal replacement is presented in the Table 3.

Table 3. Impact of Front Line Demonstrations (FLDs) on Varietal Replacement

No.	Crop	Previous	New variety grown variety introduced
1.	Groundnut	SB-11, Local	Konkan Trombay Tapora Konkan Gaurav TG-26

It was found that the varieties of groundnut such as SB-11 and local were replaced by Konkan Tapora, Konkan Gaurav and TG-26.

4. Impact of horizontal spread in groundnut due to Front Line Demonstrations

The impact of horizontal spread due to Front Line demonstration is presented in Table 4.

It is seen the area in change was highest in Konkan Trombay Tapora followed by Konkan gaurav and TG-26. The percent impact of horizontal spread due FLDs was 62.00, 44.00 and 40.00 for the variety Konkan Trombay Tapora followed by TG-26 and. Konkan gaurav

CONCLUSION

- The Front Line Demonstrations (FLDs) organized by KVK, Roha made good impact on yield enhancement of Groundnut (77.40 %) . The varieties developed by Dr. BSKKV, Dapoli have

Table 4. Impact of horizontal spread due to Front Line Demonstrations

S.No.	Variety	Area (ha)		Change in Area	Impact (% Change)
		Before Demo	After Demo		
1	Konkan Trombay Tapora,	2	3.25	1.25	62.00
2	Konkan Gaurav	1.25	1.80	0.55	44.00
3	TG-26	1.35	1.90	0.55	40.00

higher yield potential on farmer's field.

- Impact of FLDs on adoption of technologies showed that there is increase in adoption groundnut production technologies by 81.33 percent. The FLD made positive impact on use of fertilizer management, earthing up, weed management, seed treatment and improved varieties. Further, it was found that SB-11 and local variety of groundnut were replaced by Konkan Tapora, Konkan Gaurav and TG-26 remarkably.

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CONSTRAINTS PERCEIVED BY THE FARMERS IN ADOPTION OF RECOMMENDED CORIANDER PRODUCTION TECHNOLOGY

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ABSTRACT

Present study was conducted in Baran district which was selected purposively. The Baran district consists of eight tehsils. Out of which two tehsils namely Atru and Chhipabrod were selected randomly Atru and Chhipabrod tehsils comprises of 34 and 29 gram panchayats respectively. Among these two gram panchayats from Atru tehsil and two gram panchayats from Chhipabrod tehsil, were selected by randomly. Eight villages were selected from the selected four gram panchayats by using simple random sampling technique. Samples of 120 coriander growers were selected from these selected villages by using simple random sampling with proportion to size of sample. Among the four constraints related to input, was the major constraints perceived by the coriander growers. This constraint was followed by constraints related to marketing, miscellaneous. Least perceived constraints were technical constraints. The overall constraints faced by the respondents were 52.30 MPS.

INTRODUCTION

India has been the 'Home of Spices' since time immemorial. It is the world largest producer, consumer and exporter of seed spices which are being cultivated widely in the country over different agro-climatic zones. Seed species crop occupy, prominent place in the total basket of spices of the country and play a significant role in our national economic. The group of spices account for about 37 per cent and 18 per cent of the total area and production of spices in the country, respectively. Coriander is a winter season crop and requires moderately cool climate to its proper growth and development. In India, it is grown mainly in rabi season. India has a unique place in seed spices map of world which produces 1042200 tonnes seed from 1207100 hectare area. Out of the total seed spices produce in India, coriander with contributes 46.24 per cent whereas, in respect of area, coriander covers 43.98 per cent. (Spices Board and CMIE 2010-11)

RESEARCH METHODOLOGY

Samples of 120 coriander growers were selected from these selected villages by using simple random sampling with proportion to size of sample in Baran district of Rajasthan. The constraint that hinders the adoption of recommended coriander production technology, a separate schedule was prepared for

study. All possible constraints were included in the schedule in accordance with the coriander production technology. The responses obtained from respondents were recorded on a three point continuum scale *viz.*, very important, important and least important and were assigned 3, 2 and 1 score respectively.

RESULTS AND DISCUSSION

1. Input constraints perceived by the farmers in adoption of recommended coriander production technology

A critical examination of Table 1 revealed that majority of respondents were facing problems of "green colour maintaining variety is not available in the market" (78.61 MPS) followed by "unavailability of short duration varieties" (76.11 MPS) and higher cost of labour (75.27 MPS) in adoption of recommended coriander production technology, "uncertainty of good production" "seed, fertilizer and chemicals" are costly and lack of irrigation facility were ranked 4th, 5th and 6th respectively. Least problems faced by them were to "unavailability of improved seed at the time of sowing". The Table further shows that coriander growers reported major problem (above 70 MPS) regarding unavailability of varieties maintaining green colour after harvest, unavailability of short duration varieties, higher cost

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labour and uncertainty of good production. Further constraints (above 50 to 70 MPS), “seed, fertilizer and chemicals are costly inputs”, “lack of irrigation facility,” “required more organic matter”. And “unavailability of fertilizers” during peak season was moderately. Least constraints (below 50 MPS) perceived by coriander growers were, unavailability of fertilizers during peak season were moderately, small land holding, supply of inferior quality of seed by the agencies, unavailability of recommended chemical for plant protection, and unavailability of improved seed at the time of sowing.

Table 1. Input constraints perceived by the farmers in adoption of recommended coriander production technology

n = 120		
No. Constraints	Mean % score	Rank
1. Unavailability of improved seed at time of sowing	28.88	XII
2. Supply of inferior quality seed by the agencies	35.27	X
3. Unavailability of fertilizer at the peak seasons	47.22	VIII
4. Unavailability of recommended chemical for plant protection measures	33.88	XI
5. Lack of irrigation facility	56.11	VI
6. Uncertainty of good production	72.77	IV
7. Small land holding	45.55	IX
8. Requires more organic manure	54.72	VII
9. Unavailability of short duration varieties	76.11	II
10. Green colour maintaining variety is not available in the market	78.61	I
11. Seed fertilizer and chemical are costly input	62.50	V
12. High cost of labour	75.27	III
Average	55.57	

2. Technical constraints perceived by the farmers in adoption of recommended coriander production technology

A critical examination of Table 2 reveals that

majority of coriander growers were facing major problem lack of knowledge about grading and standardization, lack of knowledge about chemical weed control and lack of knowledge about seed treatments with 53.88, 46.66 and 46.38 MPS, respectively followed by lack of knowledge about cultivation of high yielding varieties with 45.83 MPS in the adoption of recommended coriander production technology. Lack of knowledge about recommended seed rate and lack of knowledge about plant protection chemicals were ranked 5th and 6th respectively. Least problems were faced by them was poor knowledge about dose of chemical fertilizers, poor knowledge about irrigation management and technical guidance unavailable were ranked 7th, 8th and 9th respectively by them.

Table 2. Technical constraints perceived by the farmers in adoption of recommended coriander production technology

n = 120		
No. Constraints	Mean % score	Rank
1. Lack of knowledge about seed treatment	46.38	III
2. Lack of knowledge about grading and standardization	53.88	I
3. Lack of knowledge about cultivation of HYV	45.83	IV
4. Lack of knowledge about recommended seed rate	43.05	V
5. Poor knowledge about dose of chemical fertilizer	39.72	VII
6. Poor knowledge about irrigation management	39.44	VIII
7. Lack of knowledge about plant protection chemicals	42.22	VI
8. Lack of knowledge about chemical weed control	46.66	II
9. Technical guidance unavailable at the time of sowing	37.77	IX
Average :-	43.88	

3. Marketing constraints perceived by the farmers in adoption of recommended coriander production technology

A critical examination of Table 3 reveals that over all respondents were facing major problems like minimum support price is not fixed by government (74.05 MPS) and high fluctuation in price (70.88 MPS) in the adoption of coriander production technology. Low price of good quality product in the market, lack of storage, facilities and transportation facilities are very costly were ranked 3rd, 4th and 5th, respectively and incorrect weight measurement by businessman, lack of knowledge about market intelligence and unnecessary deduction by the businessman were ranked 6th, 7th and 8th, respectively.

Table 3. Marketing constraints perceived by the farmers in adoption of recommended coriander production technology

n = 120		
No. Constraints	Mean % score	Rank
1. Lack of storage facilities	53.33	IV
2. Transportation facilities are very costly	52.50	V
3. Lack of knowledge about market intelligence	42.77	VII
4. Incorrect weight measurement by businessman	47.77	VI
5. Low price of good quality product in the market	58.88	III
6. Unnecessary deduction by businessman	41.38	VIII
7. Minimum support price is not fixed by Govt.	74.05	I
8. High fluctuation in price	70.88	II
Average	55.19	

4. Miscellaneous constraints perceived by the farmers in adoption of recommended coriander production technology

A critical examination of Table 4 reveals that majority of the respondents were facing serious constraints regarding to cloudy weather and rainfall at the time of flowering and seed formation with (66.88 MPS). Further followed constraints which were faced relatively lesser extent by early showing coriander

crop affected by the low temperature, unable to bear risk, the harvested coriander crop affected by the wind, late sowing reduces the yield and more attack insect pest disease with 66.66, 55.66, 52.22, 54.72 and 50.88 MPS, respectively.

Table 4. Miscellaneous constraints perceived by the farmers in adoption of recommended coriander production technology

n = 120		
No. Constraints	Mean % score	Rank
1. Cloudy weather and rainfall at time of flowering and seed formation	66.66	I
2. The early showing coriander crop affected by the low temperature	55.66	II
3. The harvested coriander crop affected by the wind	52.22	IV
4. Unable to bear risk	54.72	III
5. Late sowing reduces the yield	50.61	V
6. More attack insect pest disease	50.88	VI
Average	55.08	

5. Overall constraints perceived by the farmers in adoption of recommended coriander production technology

The data in Table 5 reveal that among the four categories of constraints, input, technical, marketing and miscellaneous constraints. Out of which input constraints were showed highest intensity. Followed by marketing constraints, miscellaneous constraints in and technical constraints were perceived least and respondents.

Table 5. Overall constraints perceived by the farmers in adoption of recommended coriander production technology

n = 120		
No. Constraints related to	Mean % score	Rank
1. Input constraints	55.57	I
2. Technical constraints	43.38	IV
3. Marketing constraints	55.19	II
4. Miscellaneous constraints	55.08	III
Average	52.30	

These findings are in line of finding of Jaitawat *et.al* (2007), Jat (2008) and Meena (2010) who found that major constraints in adoption of recommended coriander production technology were Green colour maintaining variety is not available in the market, Minimum support price is not fixed by Government, Cloudy weather and rainfall at time of flowering and seed formation and Lack of knowledge about grading and standardization.

CONCLUSION

The most severe Input constraints like Lack of knowledge about Green colour maintaining variety is not available in the market, Marketing constraints, like Minimum support price is not fixed by Government Miscellaneous constraints, like Cloudy weather and rainfall at time of flowering and seed formation, Technical constraints, like lack of knowledge about grading and standardization were found.

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FOOD SECURITY THROUGH HOMESTEAD VEGETABLE PRODUCTION

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ABSTRACT

The study was conducted in five villages (Bhagwanda, Oda, Nakli, Bhana and Khedana) of district Rajsamand during 2015. Diagnostic survey was conducted in villages especially for determining effect of homestead vegetable production. One hundred respondents (50 homestead vegetable producers and 50 non-producers) were randomly selected from the beneficiaries of KVK nutritional security programme in rural area. Data was collected by face-to-face interview with the help of interview schedule. Most of the respondents were middle-aged having small farm size and primary level education. Vegetable production, consumption and calorie uptake of the respondents were increased by 100%, 83.48% and 55.38%, respectively, after implementation of demonstration. Nutrient contribution from the produced vegetables through homestead vegetable production fulfilled the 386.66% requirement of vitamin A, 2375% vitamin C, and 223.52% iron. It also fulfilled 50.20% of protein and 120.83% of calcium requirement as per Recommended Dietary Allowance. Four vegetable crops i.e. red amaranth, cabbage, tomato and peas were introduced into the existing cropping pattern. Changes in social and livelihood issues of respondent were satisfactory after demonstration. Majority of the respondents (45%) earned handsome annual income having homestead vegetable production. Shortage of irrigation water, quality seeds and input cost were the major problems faced by the farmers in homestead vegetable production.

INTRODUCTION

The rural people especially women and children of operational areas are severely malnourished alongwith multiple nutrient deficiency disorders due to ignorance about importance of fruits and vegetables in their diets. Only some rural families used to broadcast seeds of okra, ridge gourd, bottle gourd, muskmelon, watermelon in between rows of cereal crops during *kharif* season for their home consumption. Landless and marginal farmers have no or very small crop field. Usually they are maintaining their livelihood by utilizing the homestead resources and selling of labour. The year round selling of labour is not evenly distributed. Potentiality of labour selling in agriculture is minimum in the rainy season and off-season when they suffer more malnutrition. Considering the importance of vegetable in overcoming the problem of micronutrient deficiencies and in view of the need to increase the production of vegetables by all possible means some research activities were initiated by KVK during the last few years to find out ways to boost vegetable production in rural homes. The idea was to develop an intensive system of production by which small

families can get sufficient nutritious vegetables throughout the year and thereby ensure the supply of needed micronutrients for the family members. The concept of nutrition-garden was popularized alongwith cultivation of horticultural crops among the poor rural farmers by integrating production of required seasonal vegetables for continuous supply round the year. For better nutritional security papaya + lime plants (10 + 2) were planted near source of irrigation or backside of their house for establishing nutrition gardens as an initiative. Each household was provided with a kit of vegetable seeds of cucumber, okra, ridge gourd, bottle gourd, cluster bean, tomato, chilli, spinach, pea, radish, cabbage, cauliflower, carrot, and fruit plants like papaya etc. by the KVK once and then after that they were asked to follow in a similar way. Home gardens play an important role in fulfilling dietary and nutritional needs. Home gardening can contribute to household food security by providing household with direct access to food that can be harvested, prepared and consumed by household members, often on a daily basis (Marsh, 1998a and Marsh 1998b). These gardens are not only important sources of food, fodder, fuel, medicines, spices and household income

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in many countries around the world, but are also an important means for in situ conservation of a wide range of plant genetic resources. The fruit plants and vegetable plants are an important source of income. Their sale and barter contribute to the economic development of rural communities and support modern industrial development (Ijiru *et al.*, 2011). So the specific objectives of the study entitled “Food security through homestead vegetable production” were framed: to know the socio-economic condition of farmers and their present vegetable production status; to identify the impact of homestead vegetable production in food and nutritional security; and to identify problems in homestead vegetable gardening.

RESEARCH METHODOLOGY

The purpose of the study was to determine food security through homestead vegetable production. The study was conducted in five villages (Bhagwanda, Oda, Nakli, Bhana and Khedana) of district Rajsamand during 2015, which were KVK adopted villages and covered under nutritional security programme by establishing homestead vegetable gardens by distributing required seed and technology. A list of the home gardening demonstration farmers of study area was prepared with the help of KVK scientists. All the listed demonstration farmers constituted the population of the study. From the listed 100 demonstration farmers, 50 farmers were selected as sample following random sampling technique. For comparative study another 50 farmers were also selected by simple selection method those who had not homestead vegetable garden. Data were collected by face-to-face interview with the help of interview schedule. For this study a well designed questionnaire was developed and pre-tested. Primary data was collected with the help of a questionnaire. The respondents were interviewed in their houses and farm. These places were selected for the convenience of respondents and for creating congenial situation, where both sides (researcher and respondent) exchanged their views frankly and informally with the help of local personnel (village level workers). The interview schedule contained both open and closed form questions and it was designed in English but the questions were asked in Hindi and local language (Mewari) in order to avoid

confusion. Nutritional values of different vegetables were calculated according to Islam *et al.*, (2003) with the help of nutritional value index.

RESULTS AND DISCUSSION

Demographic characteristics of the farmers

The farmers ranged in age from 18 to 50 years and the average age was 34.17 years. The highest proportion (50%) of the respondents were in middle-age group as compared to 8% who were old and 17% of the respondents were young (Table 1). Educational scores ranged from no formal education to Secondary with an average of 4.71 (60%) respondents had primary level education and 32% respondents had secondary level education, compared to 8 illiterate. It is very important to note that most of the respondents (92%) were educated. The family size of the respondents ranged from 2 to 7 with an average size 4.38. The highest proportion 54% of the respondents had medium family size while 44% of the respondents had small and 2% had large family sized categories (Table 1). The highest proportion 60% had small farm size rest of the 20% had medium farm size. The average farm size was 0.72 ha. Most of the respondents (40%) were in high income as compared to 34% medium income and 26% low income respectively. The computed scores of the respondents based on extension contact score of the respondents ranged from 16 to 24 and the mean score was 19.18. Most of the respondents had medium (50%) communication exposure followed by low (28%) and high (22%) communication respectively (Table 1).

Contribution to food security

Homestead vegetable production contributes to household food security by providing direct access to food that can be harvested, prepared and fed to family members, often on a daily basis.

Even very poor, landless or near landless people practice gardening on small patches of homestead land, vacant lots, roadsides or edges of a field, or in containers. Gardening may be done with virtually no economic resources, using locally available planting materials, green manures, fencing and indigenous methods of pest control. Thus, homestead vegetable production at some level is a production system that

Table 1. Distribution of selected characteristics of the respondent farmers

Characteristics	Categories	Growers		Mean	SD
		Number (N=50)	Per cent		
Age (years)	Young aged (up to 30)	17	34.0	34.17	9.53
	Middle aged (31-50)	25	50.0		
	Old (>50)	8	16.0		
Education	Illiterate (0)	4	8.0	4.71	1.25
	Primary (1-5)	30	60.0		
	Secondary (6-10)	16	32.0		
Family size	Small (up to 4)	22	44.0	4.38	1.44
	Medium (5 to 6)	27	54.0		
	Large (7 and above)	1	2.0		
Farm size (Bigha)	Marginal (< .02)	5	10.0	0.72	0.20
	Small (>.02 to 0.99)	30	60.0		
	Medium (1-2.99)	10	20.0		
	Large (3.00 and above)	5	10.0		
Annual income (Rs./annum)	Low (up to 25,000)	20	40.0	6.06	1.09
	Medium (25,001- 50,000)	17	34.0		
	High (50,001 and above)	13	26.0		
Extension media contact (per annum)	Low (up to 18)	14	28.0	19.18	2.0
	Medium (>18-20)	25	50.0		
	High (above 20)	11	22.0		

the poor can easily enter. Gardening provides a diversity of fresh foods that improve the quantity and quality of nutrients available to the family.

Households with gardens typically obtain from them more than 50 percent of their supply of vegetables and fruits including radish, cole crops, bean, pea, spinach, carrot, tomato, brinjal (Rabi season), cucurbits, okra, tomato, cluster bean, chilli (Kharif and Zaid season), fruit plants papaya and lime (Table 2). Average vegetable production in the home garden was 439.0 kg and 57.5 kg respectively before and after establishing gardens (Table 2). These families consumed their organically grown vegetables (203 kg) and fruits (125 kg papaya and 20 kg lime) which helped to improve their nutrition and further surplus produce (25 kg papaya and 60 kg lime) was sold in the village market fetching small income (Rs. 1200-1500 per annum). Homestead production is also

an important source of supplementary income for poor rural and urban households around the world. The combined value of garden production, including sale of surplus vegetable produce and animal products combined with savings in food and medical expenses, varies seasonally but constitutes a significant proportion of total income (upwards of 20 percent) for many households. The garden may become the principal source of household food and income during periods of stress, e.g. the pre harvest lean season, harvest failure, prolonged unemployment, health or other disabilities suffered by family members or agricultural and economic disruption. Similar results were also reported by Rahman *et al.*, 2008 and Bhardwaj *et al.*, 2013.

Per day vegetable consumption and calorie distribution

Vegetables are important source of vitamins and

Table 2. Homestead vegetable production contribution in nutritional security

Season	Name of vegetables	Average production of vegetables (kg.) family ⁻¹	Market value in (Rupees) family ⁻¹	Average consumption of vegetables family ⁻¹ (kg)	Average consumption of vegetables family ⁻¹ (kg) prior to kitchen garden	Nutritional status/additional consumption
Rabi	Radish, cole crops, bean, pea, spinach, carrot, tomato, brinjal	85.00	923.0	75.0	18.50	Improved (56.5 kg)
Khariff	Cucurbits, okra, tomato, cluster bean, chilli	68.50	785.0	65.0	15.50	Improved (49.5 kg)
Zaid	Cucurbits, okra, tomato, cluster bean, chilli	55.50	620.0	63.0	23.5	Improved (49.5 kg)
Papaya	5 plants round the year	150.0	1500.0	125.0 (25.0 kg sold in market)	Nil	Improved (125.0 kg)
Lime	2 plants round the year	80.0	1200.0	20.0 (60.0 kg sold in market)	Nil	Improved (20.0 kg)
Total	439.0	5068.0	348.0	57.5	275.5	

minerals in the diet. Fruits and vegetables serve the same nutritional purpose, but vegetables are much easier and cheaper to produce. Moreover, vegetables are generally able to produce more nutrients per unit time. The National Nutrition Council of India has proposed for the country a balanced diet in the recommended quantity of vegetables including tubers and spices is 280 grams per head per day. The respondents mainly produced leafy vegetables in the home garden and they consumed maximum amount of vegetables for improving their food and nutritional status. Food and nutritional status of different vegetables were measured with the help of nutritional value index. Calculated amount of calorie uptake from different vegetables were presented in Table 3. Homestead vegetable non-producers overall per day vegetable production was 0.0g and homestead vegetable producers it was 240.54g per day and consumption was 190.68g and 31.50g in producer and non-producer, respectively. It was observed that (Table 3) production and consumption increased in both the cases. Total calorie uptake from different consumed vegetable was 72.0 k.cal. and 130.0 k.cal. in the non-producer and producer group, respectively.

Calorie uptake was also increased by 58.0 k.cal. in homestead vegetable producers. It was found that the homestead vegetable producers average vegetable consumption and calorie uptake were increased fulfilling the recommendations. Similar results were also reported by Marsh, 1998a and Bhardwaj, 2013.

Table 3. Average vegetable and fruit production, consumption and calorie contribution

Category	Production (g)/day	Consumption (g)/day	Calorie uptake (K.cal)/day
Homestead vegetable producers	1202.73 (240.54)	953.42 (190.68)	130
Homestead vegetable non-producers	0.0 (0.00)	157.53 (31.50)	72
Difference	1202.73 (240.50)	795.89 (159.17)	58
Per cent increase	100	83.48	55.38

Nutrient contribution from homestead vegetable gardening

Vegetables are the important source of essential nutrients for human. Particularly leafy vegetables are rich in these nutrients. In the homestead vegetable gardening, respondents used to grow 15-20 different kinds of leaf, stem and root oriented vegetables. Different essential nutrients contribution from these vegetables was presented in Table 4. It was found that different essential nutrients such as protein, vitamin A, Vitamin C, calcium and iron contribution from different vegetables increased after homestead vegetable gardening. Keeping in view Recommended Dietary Allowances (RDA), the vegetables grown in home garden fulfilled the 386.66% requirement of vitamin A, 2375% vitamin C, and 223.52% iron. It also fulfilled 50.20% of protein and 120.83% of calcium requirement. Vegetables are not rich in protein but improve the protein nutrition status if taken with the cereals and pulses. Table 4, showed that selected essential nutrient contribution was changed significantly after demonstration. Very small mixed vegetable gardens can provide a significant percentage of the recommended dietary allowance for protein (10 to 20 percent), iron (20 percent), calcium (20 percent), vitamin A (80 percent) and vitamin C (100 percent) (Marsh and Talukder, 1994). Similar results were also reported by Marsh, 1998b, Islam *et al.*, 2003, Ijnu *et al.*, 2011 and Bhardwaj *et al.*, 2013.

Disease incidence

The maximum rural population especially women

and children of operational area were severely malnourished alongwith multiple nutrient deficiency disorders due to ignorance about importance of fruits and vegetables in their diets. Baseline study showed that they hardly purchased fruits and vegetables from market for consumption. After establishment of homestead vegetable garden significant change was reported in nutritional status and nutrient deficient disease. The maximum homestead vegetable growers did not showed night blindness, iodine deficiency and vitamin C deficiency symptoms but low severity of calcium deficiency and protein energy malnutrition was reported (Table 5). Similar results were also reported by Rahman *et al.*, 2008 and Bhardwaj, 2013.

Changes in social and livelihood issues

Social and livelihood issues of respondents were very important factor. Homestead vegetable production can play an important role in changing social and livelihood issues. As shown in Table 6, overall change was observed in some selected social and livelihood issues. Regarding issue-wise changes, vegetable consumption, information about seed and production technology, adoption of IPM and INM, opportunity of income generation and use of biological control changed partially to greatly, contact with extension workers, homestead land use pattern and opportunity of income generating activities were changed partially to moderately and contact with KVK scientists and post harvest management of vegetables changed from moderately to greatly. Islam and Ahmad (2004) and Rahman *et al.*, (2008), also observed some changes in social

Table 4. Change in nutritional status through homestead vegetable production

Category	Edible yield g day ⁻¹		Nutrient yield/day									
	P*	NP**	Protein (g)		Vitamin A (µg)		Vitamin C (mg)		Calcium (mg)		Iron (mg)	
	P*	NP**	P	NP	P	NP	P	NP	P	NP	P	NP
Daily consumption	190.68	31.50	30.12	7.15	2320	370	950	62	725	135	38	7
RDA			60	60	600	600	40	40	600	600	17	17
% of RDA contribution			50.20	11.91	386.66	61.66	2375	155	120.83	22.50	223.52	41.17

*homestead vegetable producers, **homestead vegetable non-producers

Table 5. Effect of homestead vegetable production on disease incidence in respondents

Name of Disease	Family size	Kitchen-gardener (n=50)		Non-kitchen-gardener (n=50)	
		Total No. family members	Severity (L/M/H)	Total No. family members	Severity (L/M/H)
PEM	Small (up to 4)	1	L	2	M
	Medium (5 to 6)	2	L	3	M
	Large (7 and above)	4	M	5	H
Night blindness	Small (up to 4)	1	L	2	M
	Medium (5 to 6)	2	L	3	H
	Large (7 and above)	2	L	4	H
Iodine deficiency	Small (up to 4)	0	-	1	L
	Medium (5 to 6)	0	-	1	L
	Large (7 and above)	0	-	2	L
Iron deficiency	Small (up to 4)	1	L	2	M
	Medium (5 to 6)	1	L	2	M
	Large (7 and above)	1	L	4	H
Calcium deficiency	Small (up to 4)	4	L	4	H
	Medium (5 to 6)	6	L	6	H
	Large (7 and above)	7	L	7	H
Vitamin C deficiency	Small (up to 4)	0	-	1	L
	Medium (5 to 6)	0	-	3	L
	Large (7 and above)	0	-	4	L

and livelihood issues.

Problems faced in homestead vegetable production

Most of the respondents reported shortage of irrigation water in dry season as biggest problem. Actually irrigation was the most critical input for vegetable cultivation, in the *Rabi* and *Zaid* season. Irrigation of vegetable in home garden is possible by water supply from tube well and shallow tube wells or other sources. In the study area most of the respondent's household is high land and in dry season water level drops down. Also maximum tube well was out of order. So they faced severe problem of irrigation. Lack of quality seed was identified as another major problem. Farmers always need high quality vegetable seeds, because they have lack of technical knowledge on quality seed production and seed preservation. Sometimes they lost their money

and crops because of buying low quality seeds. High input cost was identified as another major problem. Farmers need to purchase required inputs. Sometimes input dealers and agencies cheat the farmers by taking high price for inputs. Poultry and livestock were identified as a problem in homestead vegetable gardening. Poultry and livestock damaged vegetables. So home gardening needs protection which is too expensive. Lack of storage facility was also a problem. Sometimes respondents produced excess vegetable, which they could not consume. So large amount of vegetables got waste as losses. Respondents had no technical knowledge of preservation. Lack of marketing facility was another problem. Respondents sold their vegetables in the local market due to lack of proper and cheap transportation facilities. So they did not get good price. Lack of capital was a problem of the study

area. Respondents initially need financial support to establish a home garden. Lack of technical knowledge on vegetable production and preservation, insect/pest attack on vegetables and consuming vegetable as food were identified as problem. Similar results were also reported by Marsh (1998a), Rahman *et al.*, (2008) and Bhardwaj *et al.*, (2013).

CONCLUSION

Homestead vegetable production is one of the key intervention strategies that aims to minimize food shortage providing supplementary food, primary healthcare security and be a source of nutrition. Furthermore, home gardening is only one of the possible interventions for enhancing food security

for the poor, and it should be considered in the context of a broader national food security strategy. Indeed, the complex synergies of food availability, access, consumption and nutritional status with poverty, health, mental ability, productivity and economic development demand an integrated approach to solving food insecurity in the long term. Home gardening has a special role in this strategy, in providing direct access to food through self-reliance rather than dependence on externally supported programmes such as food-for-work, targeted subsidies and supplementation and fortification schemes, none of which can be counted on for sustained support.

Table 6. Social and livelihood issues changes in different aspects of respondents

Aspect of change	Extent of change	
	Non-producers	Producers
Vegetable consumption	Partially	Greatly
Change of homestead land use pattern	Partially	Moderately
Contact with extension workers	Partially	Moderately
Contact with KVK scientists	Moderately	Greatly
Information about seed and production technology	Partially	Greatly
Adoption of IPM and INM	Partially	Greatly
Post harvest management of vegetables	Moderately	Greatly
Opportunity of income generation	Partially	Moderately
Biological control of insect and pests	Partially	Greatly

Table 7. Problems faced in homestead vegetable production

Problems faced in homestead vegetable production	Severity of problems (%)			
	Greatly	Moderately	Partially	Not at all
Shortage of irrigation water in dry season	68.7	21.0	8.3	2.0
No availability of lack of quality seed	56.7	31.3	6.3	5.7
High input cost	43.3	29.7	17.3	9.7
Damage by monkey, poultry & livestock	50.0	30.0	15.0	5.0
Lack of storage facility	36.7	40.0	16.7	6.7
Lack of marketing facility	10.5	30.5	20.3	38.7
Lack of capital	28.7	42.1	17.5	11.7
Lack of technical knowledge	27.5	52.7	10.5	9.3
Insect pest attack	16.5	40.2	30.3	13.0
Food habit	5.5	60.5	17.3	16.7

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CREDITIBILITY OF AGRICULTURE INFORMATION SOURCES AND CHANNELS UTILIZED BY NAIP BENEFICIARY FARMERS

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ABSTRACT

The study was conducted to analyze communication behavior of NAIP III beneficiary farmers of Banaskantha district of Gujarat. One hundred twenty respondents were identified based on proportionate random sampling method and data were collected from them using a well-structured and pre-tested interview schedule. The collected data were analyzed and tabulated. Communication sources were categorized into three broad heads namely personal cosmopolite source, personal localite channels, impersonal cosmopolite channels and response from taken from respondents. The finding of the study revealed that friends, neighbours Agriculture officers, Input dealers, farmer fair, farmers club, Radio television were the most credible sources channels. It was concluded that friends, neighbours and progressive farmers were the most credible personal localite sources of information and also found that Agriculture Officers, input dealers and subject matter specialists were the most credible personal cosmopolite sources of agriculture information. Found that farmer fair, farmers club, training and co-operative were the most credible personal cosmopolite channels of agriculture information. It was again found that radio and television were the most credible impersonal cosmopolite channels of agriculture information as perceived by the NAIP beneficiary farmers in the study area.

INTRODUCTION

The India is a country of diversities. The diversity particularly acute among agricultural communities varies from well mechanism and resourceful farmers of Punjab to landless tribal farmers of Gujarat. Transfer of recommended crop technology from research stations to farmers is very important for developing these farming communities.

Farmers use many information sources and channels for seeking agricultural information on improved farm practices. They may come across large number of information sources and channels but peruse only few of them. Credibility of information sources and channels affects the adoption of farmers about improved agricultural practices. Credibility refers to perceived trust worthiness and expertise accorded to a source or channel by its audience at any given time. Therefore, sources and channels of agriculture information play major role in diffusion of agriculture innovations.

Farmers respond differently to the different information sources and channels. The action of farmer mainly depends on his exposure to the sources

and channels of agriculture information. Previous researches revealed that variability of knowledge acquired through different sources and channels by the farmer's accounts for their personnel characteristics *i.e.*, age, education, family background and farming experience. Hence this study was undertaken an objective to know.

- [1] The credibility of different agricultural information sources and channels utilized by the NAIP III beneficiary farmers.

RESEARCH METHODOLOGY

The present study was conducted purposely in Banaskantha district. Among all the talukas of Banaskantha district, Amirgarh and Dantatalukas were selected NAIP III project by Sardar krushinagar Dantiwada Agricultural University. There were three villages from each talukas were selected purposely on the basis of NAIP III Project, thus total Six villages were selected for making a sample size of 120 respondents.

The present study was confined to "Ex-Post facto" research design. The selected thirteen

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independent variables were measured by using suitable scales and procedure adopted by various researchers in past with due modification. The size of sample of total 120 respondents was drawn randomly with the help of random sampling procedure. The data were collected with the help of structural and pre-tested interview schedule. The collected data were then analysed, tabulated and interpreted in the light of objectives for arriving at meaningful interpretation and findings.

RESULTS AND DISCUSSION

1. Credibility of various sources and channels of agriculture information

A. Credibility of personal localite sources

Communication source or channel is one of the most important elements of communication process and its effectiveness largely depends upon its credibility as perceived by clientele. It is necessary to know the source or channel credibility pattern for transfer of any new technology or improved practices. Credibility of particular agricultural information sources or channel can be defined as the degree to which a source or channel is perceived as trustworthy and competent by the receiver. Credibility pattern of sources and channels of agriculture information were therefore, studied and results are presented in Table 1.

Table 1. Degree of credibility of personal localite sources as perceived by the respondents (n = 120)

No.	Personal Localite Sources	MPS	Rank
1.	Progressive farmers	50.83	III
2.	Village leaders	23.33	V
3.	Friends	68.33	I
4.	Neighbors	65.00	II
5.	Relatives	28.33	IV
6.	Agriculture student	04.16	VII
7.	Religious heads	17.50	VI

As depicted in Table 1, friends (MPS 68.33) were identified as the most credible personal localite source of agriculture information. This is followed by neighbours (MPS 65.00) and progressive farmers (MPS 50.83) respectively. The other sources of information which were perceived trustworthy and competent by the farmers were relatives (MPS 28.33)

and village leaders (MPS 23.33). It is interesting to note that agriculture students were perceived as the least credible personal localites sources of agriculture information by NAIP beneficiary farmers.

B. Credibility of personal cosmopolite source of agriculture information

These are the channels of communication from outside the social system of the receiver. They are the extension agents of various organizations and are important in changing the farmers from traditional to modern. Data in this regard are presented in Table 2.

Table 2. Degree of credibility of personal cosmopolite sources as perceived by the respondents (n = 120)

No.	Personal cosmopolite sources	MPS	Rank
1.	Agriculture Officers	78.66	I
2.	S.M.Ss of Agriculture	27.50	III
3.	Inputs dealers	35.00	II
4.	Personal of voluntary organization	02.50	IV

Table 2 makes it clear that Agriculture officers (MPS 78.66) was perceived as top ranked competent and credible of agriculture information by the majority of the beneficiary farmers. Input dealers (MPS 35.00) and Subject Matter Specialist (MPS 28.33) were also proved somewhat effective among the beneficiary farmers. Surprisingly, personnel of voluntary organizations have their least according credibility the NAIP beneficiary farmers.

C. Credibility of personal cosmopolite channels

Personal localite channels are important in changing the farmers from traditional to modern. The results in this respect are in presented in Table 3.

It is obvious from Table 3 that Farmer fair (MPS 48.33) was the most credible personal cosmopolite channels of agriculture information as perceived by the beneficiary farmers in the study area. This is followed by Farmers club meeting (MPS 36.66), training (MPS 30.83), Co-operative society (MPS 25.83) and demonstrations (20.00) respectively. The farmers fair was perceived as the most credible personal localite channel of agriculture information by NAIP beneficiary farmers.

Table: 3. Degree of credibility of personal localite channels as perceived by the respondents

(n = 120)

No.	Personal localite channels	MPS	Rank
1.	Training	30.83	III
2.	Farmers club meeting	36.66	II
3.	Farmers fair	48.33	I
4.	Exposure tour	06.66	VII
5.	Demonstration (method and results)	20.00	V
6.	Co-operative society	25.83	IV
7.	Field trips	11.66	VI
8.	Workshop	03.33	VIII

D. Credibility of impersonal cosmopolite channels

Here the channels of communication are from outside the social system of the receiver and at the same time no face to face contact is involved. These are mass media, which are important in areas of high urban influence, and farmers who are modern or are changing from traditional to modern. Study data have been presented in Table 4.

Table: 4. Degree of credibility of impersonal cosmopolite channels as perceived by the respondents.(n = 120)

No.	Impersonal cosmopolite channels	MPS	Rank
1.	Radio	63.33	I
2.	Television	40.00	II
3.	Newspaper	09.16	V
4.	Farm publication	05.83	VI
5.	Traditional media (puppet, local songs, drama)	15.00	III
6.	Exhibition	10.83	IV
7.	E-mail internet	2.50	VII

It is clear from the data in table 4 that radio (MPS 63.33) was perceived as the top ranked most credible impersonal cosmopolite channel by the beneficiary farmers in the study area. Likewise televisions (MPS 40.00), and Traditional media (MPS 15.00), were also reported as credible impersonal cosmopolite channels. Surprisingly, Farm publications have lost their trust among the NAIP beneficiary in the study area.

It is inferred therefore, that radio, television and Traditional media were the most credible impersonal

cosmopolite channels of agriculture information as perceived by the beneficiary farmers in the study area.

CONCLUSION

It was concluded that friends, neighbours and progressive farmers were that most credible personal localite sources of information while, agriculture officers, input dealers and subject matter specialists were the most credible personal cosmopolite sources of information. It was further noted that farmers fair, farmers club, radio and television were the most credible cosmopolite channels of agricultural information perceived by NAIP beneficiary farmers.

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ROLE OF FARMERS FIELD SCHOOL ON FARMER'S KNOWLEDGE ABOUT MUSTARD PRODUCTION TECHNOLOGY

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ABSTRACT

The present study was conducted in Pali district of Rajasthan to assess the impact of Farmers' Field Schools on knowledge and adoption of integrated crop management practices in mustard crop. A total of three blocks were selected purposely from Pali district in arid zone of Rajasthan based on the area under mustard. The total sample size was 240 comprising 120 FFS farmers and 120 non- FFS farmers. The knowledge level of the farmers was measured through a knowledge test developed for the purpose. The data were collected through interview schedule. The study revealed that knowledge level of farmers of FFS was higher than the knowledge of non-FFS farmers with regard to all the ICM practices such as integrated nutrient management, seed management, water management and integrated pest management. The results of the t-test showed that the difference between the knowledge level of the FFS and non-FFS farmers was statistically significant. It was concluded that FFS methodology is an effective extension tool to enhance farmer's knowledge related to complex crop management practices in mustard.

INTRODUCTION

Edible oilseed crops have significant contribution in Indian agriculture. Oilseeds form the second largest agricultural commodity in India after cereals sharing 14% of the gross cropped area and accounting for nearly three per cent of gross national product and 10% value of all agricultural products. The continuous increase in import of oilseeds crops, mustard occupies a prominent position in Indian oilseeds scenario. The total area under rapeseed-mustard was 7.79 million hectares with a total production of 9.44 million tones, contributing 33.74% of the total production of oilseed in India (Anonymous, 2014). Indian mustard (*Brassica juncea* (L) Czern & Coss) is the major oilseed crop grown in Rajasthan during rabi season. In Rajasthan, the productivity of rapeseed-mustard was 1266kg/ ha during 2013-14, 31.37 lakh ha area under cultivation and total production was 39.65 lakh tons (2014) DOA (2014). The yield levels also have been variable ranging from 954 (2009-10) to 1342 kg/ha (2014) during the past five years. Though rapeseed-mustard group of crops occupy prominent position in the state oilseeds scenario but vast yield gap exists between potential yield and yield under real farming situation. The available agricultural technology does not serve

the very purpose until it reaches and adopted by its ultimate users the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users (Sharma *et al.* 2014).

The progress and prosperity of a nation to a very great extent depends on how far its agriculture sector is advanced and modernized. Adoption of improved and innovative agricultural technologies by the majority of agriculturists is a pre-requisite to agricultural development in the developing countries like India where the economy is mainly based on agricultural sector. One of the main challenges that extension and research is currently confronting is effective transfer of agricultural technology. Due to rapid technological and scientific growth, the problem gets even more complicated and intricate. Beside these, lack of knowledge of innovative technologies is another key fundamental problem for agricultural development. The Farmer Field School (FFS) is one of the most effective extension approaches ever developed (Dinpanah *et al.* 2010). It is a group-based learning process where farmers carry out experiential learning activities that help them to understand the ecology of their crop fields. These activities involve simple experiments, regular field observations and group analysis. The knowledge gained from these

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activities enables participants to make their own locally specific decisions about crop management practices (Kenmore, 2002). Modification of any crop production practice ultimately affects yield through complex interactions with the crop and environment. This approach represents a radical departure from earlier agricultural extension programmes, in which farmers were expected to adopt generalized recommendations that had been formulated by specialists from outside the community. Keeping the above facts in view the present study was formulated to measure component wise knowledge of integrated crop management (ICM) practices in paddy with respect of farmers those who have been trained under FFS as compared with farmers those who have not been trained under FFS.

RESEARCH METHODOLOGY

The study followed an ex-post-facto research design. The present study was conducted in Pali district of Rajasthan. A total of three blocks were selected purposively from the Pali district of Rajasthan based on the area under mustard. The selected blocks were Sumerpur, Raipur and Sojat. A total of six villages, two villages from each blocks (one FFS village and one non-FFS village) were selected based on random sampling. From each FFS and non-FFS village, 20 farmers were selected through random sampling method. Thus the total sample of the study consisted of 240 farmers which had 120 FFS farmers and 120 non-FFS farmers. Data were subjected to descriptive statistics such as percentage analysis and independent 't' test. Data were analyzed using the statistical parameters mean, standard deviation, percent and 't' value. To measure the knowledge of farmers about different integrated crop management practices in mustard crop a knowledge test was developed.

RESULTS AND DISCUSSION

Knowledge of Integrated Crop Management practices

The knowledge level of ICM practices was studied with respect to components like integrated nutrient management, seed management, water management and integrated pest management. The recommended practices related to integrated nutrient

management consisted of soil testing, use of organic manures, optimum dose of chemical fertilizers application and corrective measures for micronutrients deficiency. Similarly, the recommended practices related to seed management consisted of seed rate, seed treatment and spacing. The recommended practices related to water management consisted of critical stages of water requirement, benefit of land leveling, timely weeding, seed treatment and maintenance of water depth. Practices with respect to integrated pest management were further classified into four major sub components such as cultural control measures, mechanical control measures, biological control measures and chemical control measures. The recommended practices related to cultural control measures consisted of summer ploughing, selection of tolerant varieties and conservation of beneficial insects. Similarly, the practices related to mechanical control measures consisted of physical destruction of pests, insect trap benefits and method of line sowing. The biological control measures consisted of botanical pesticides and bio-pesticides and chemical control measures consisted of the following: benefit of line sowing, knowing of registered plant protection products, observing appropriateness of chemical, awareness of banned chemicals and advantage of Economic Threshold Level (ETL) respectively.

Knowledge of crop production practices of FFS and non FFS farmers

Integrated Nutrient Management: The results of knowledge level of farmers with respect to INM practices are presented in Table 1. The study reveals that in the case of FFS farmers, knowledge level was the highest for organic manures (78.93%) followed by optimum dose of chemical fertilizers application (71.65%), purpose of soil testing (63.24%), corrective measures for micro-nutrients deficiency (56.77%) and method of collection of soil sample (45.53%). In the case of non-FFS farmers, the highest level of knowledge was found with regard to organic manures (73.34%) followed by optimum dose of chemical fertilizers application (45.67%), corrective measures of micronutrients (33.20%), purpose of soil testing (26.66%) and method of collection of soil sampling (19.81%). A comparative analysis of knowledge level showed that the purpose of soil testing was known

Table 1. Knowledge regarding integrated nutrient management, seed management and water management practices in mustard

Practices	% Knowledge		Difference in % knowledge gained
	FFS Farmers (n=120)	Non-FFS Farmers (n=120)	
Integrated nutrient management			
Purpose of soil testing	63.24	26.66	36.58
Method of collection of soil sampling	45.53	19.81	25.72
Organic manures	78.93	73.34	05.59
Optimum dose of chemical fertilizers application	71.65	45.67	25.98
Corrective measures for micro-nutrients deficiency	56.77	33.20	23.57
Seed management			
Seed rate	96.22	87.13	05.09
Seed treatment	61.56	36.34	25.22
Plant spacing	75.44	55.90	19.54
Water management			
Critical stages of water requirement	94.87	85.44	09.43
Benefit of land leveling	96.14	91.59	04.55
Timely weeding	94.23	88.71	05.52
Alternate wetting and drying	89.39	85.21	04.18
Maintenance of water depth	91.68	84.81	06.87

to 63.24 per cent of FFS farmers while only 26.66 per cent of non-FFS farmers knew about it. The correct method of soil sampling was known to 45.53 per cent of FFS farmers while only 19.81 per cent non-FFS farmers were aware of it. Both FFS (78.93%) and non-FFS (73.34%) farmers had high level of knowledge about organic manures. However, a large percentage of FFS farmers (71.65%) had knowledge of chemical fertilizers application when similar situation existed in the case of knowledge of corrective measures for micronutrients deficiency for FFS (56.77%) and non-FFS farmers (33.20%).

The data in Table 1 further shows that the difference in knowledge level between FFS and non-FFS farmers was the highest for purpose of soil testing (36.58 %), followed by chemical fertilizers (25.98%), method of collection of soil sample (25.72%), corrective measures of micro nutrient

deficiency (23.57%) and organic manures (05.59%). The study revealed that participation in FFS has helped them in enhancing the overall knowledge of INM practices. The increase in knowledge level was high for soil testing (purpose and method) followed by optimum application of chemical fertilizers and corrective measures of micronutrient deficiency. The findings confirm with the findings of Manoj and Vijayaragavana (2014).

Seed Management: Table 1 reveals that the knowledge level of FFS farmers was the highest for recommended seed rate (96.22%) followed by plant spacing (75.44%) and seed treatment (61.56%). In the case of non-FFS farmers, a similar situation existed though the percentage of knowledge level was relatively lower. A comparative analysis of knowledge level shows that both FFS (96.22%) and non-FFS (87.13%) farmers had a higher level of knowledge

about recommended seed rate. However, the knowledge of seed treatment was known to 61.56 per cent of FFS farmers while only 36.34 per cent of non-FFS farmers knew about it. Moreover a large percentage of FFS farmers (75.44%) had knowledge about plant spacing when compared to non-FFS farmers (55.90%). The data in Table 1 further show that the difference in knowledge level between FFS and non-FFS farmers was the highest for seed treatment (25.22%), followed by plant spacing (19.54%) and seed rate (05.09%). The study showed that participation of farmers in FFS has helped them in enhancing the overall knowledge of seed management practices. The increase in knowledge level was higher in case of seed treatment followed by plant spacing and recommended seed rate.

Water Management: The investigation revealed (Table 1) that in case of FFS farmers with regard to water management practices the knowledge level was the highest for benefit of land leveling (96.14%) followed by critical stages of water requirement (94.87%), timely weeding (94.23%) maintenance of water depth (91.68 %) and irrigation requirement (89.39.67 %). In case of non-FFS farmers a similar situation existed. A comparative analysis of knowledge level shows that both FFS (96.14 %) and non-FFS (91.59 %) farmers had a higher level of knowledge about land leveling. The knowledge level was also high with regard to timely weeding (FFS 94.23 %, non-FFS 88.71%), critical stages of water requirement (FFS 95.87%, non-FFS 85.44%) alternate wetting and drying (FFS 89.39%, non-FFS 85.21%) and maintenance of water depth (FFS 91.68%, non-FFS 84.81%). The data in Table 1 further show that the difference in knowledge level between FFS and

non-FFS farmers was very less in all areas of water management such as critical stages of water requirement (9.43%), maintenance of water depth (6.87%) benefit of land leveling and timely weeding (4.55%) and irrigation requirement (4.18%), respectively.

The study showed that participation in FFS has helped them in enhancing the overall knowledge of water management practices. The increase in knowledge level was higher in case of critical stages of water requirement followed by maintenance of water depth. Independent 't' test was carried out to assess the significance of mean difference between FFS and non-FFS farmers in relation to knowledge about integrated crop management practices. Table 2 reveal that the calculated 't' values of all the components of ICM practices such as integrated nutrient management (4.78), seed management (5.35) and water management (7.21) were greater than the theoretical value of 1.97 with 238 degree of freedom. Thus it is clear that there was a significant mean difference between FFS and non-FFS farmers' knowledge about crop production practices related to integrated nutrient management, seed management and water management. The overall picture related to knowledge of crop production practices showed that the participation of farmers in FFS has helped them in significant level of gaining in the knowledge related to Integrated Nutrient Management (INM), seed management and water management. The findings confirm with the findings of Manoj and Vijayaragavana (2014).

Knowledge of IPM practices

Cultural control measures: The results of

Table 2. Significance difference between FFS and non-FFS farmers' knowledge about crop production practices

Components	FFS		Non-FFS		't' value
	Mean	SD	Mean	SD	
Integrated nutrient management	3.81	.831	1.29	.521	4.78**
Seed management	2.98	.765	1.83	.632	5.35**
Water management	4.88	.943	3.02	.711	7.21**

**Significance at 1 % level of significance

FFS= Farmers field school

(n=240)

knowledge level of farmers with respect to IPM practices are presented in Table 3. The study reveals that with respect to cultural control measures, knowledge level of FFS farmers was the highest in case of summer ploughing (100.00%) followed by selection of tolerant varieties (76.26%) and conservation of beneficial insects (57.37%). A similar knowledge level situation existed in case of non-FFS farmers though they had relatively lower level of percentage of knowledge. A comparative analysis of knowledge level shows that all (100.00%) farmers of the FFS as well as non-FFS villages had knowledge about summer ploughing. However, a large percentage of FFS farmers (76.26%) had knowledge of proper selection of tolerant varieties when compared to non-FFS farmers (37.23%). The conservation of beneficial insects was known to 57.37 per cent of FFS farmers while only 19.45 per cent non-FFS farmers were aware of it. Table 3 further shows that the difference in knowledge level between

FFS and non-FFS farmers was the highest in case of selection of tolerant varieties (39.03%) and conservation of beneficial insects (37.92%) followed by and no difference was found with respect to summer ploughing. The study showed that participation in FFS has helped them in enhancing the overall knowledge of cultural control measures. The increase in knowledge level was high in case of conservation of beneficial insects followed by selection of tolerant varieties. The findings confirm with the findings of Dinpanah, *et al.* (2010).

Mechanical control measures: The investigation showed (Table 3) that in case of FFS farmers with regard to mechanical control measures the knowledge level was the highest in case of physical destruction of pest (94.38%) followed by benefits of insect traps (62.80%) and method of line sowing (47.77%). A similar situation existed with the knowledge level in case of non-FFS farmers though they had relatively lower level of percentage of knowledge. A comparative

Table 3. Component wise knowledge about integrated pest management (IPM) in mustard (n=240)

Practices	FFS farmers (n=120)	Non-FFS farmers (n=120)	Difference in % knowledge gained
Cultural control measures			
Summer ploughing	100.00	100.00	00.00
Selection of tolerant varieties	76.26	37.23	39.03
Conservation of beneficial insect	57.37	19.45	37.92
Mechanical control measures			
Physical destruction of pests	94.38	85.55	08.83
Insect trap benefits	62.80	24.35	38.45
Seed treatment	47.77	15.49	32.28
Biological control measures			
Botanical pesticides	93.12	78.38	14.74
Bio-pesticides	63.44	12.63	50.81
Chemical control measures			
Benefits of seed treatment technique	56.91	21.37	35.54
Knowing of registered plant protection products	42.89	13.29	29.60
Appropriateness of chemical pesticides	48.90	16.66	32.24
Awareness of banned chemical pesticides	36.31	11.69	24.62
Advantages of Economic Threshold Level (ETL)	66.35	10.43	55.92

FFS= Farmers Field School

analysis of knowledge level shows that both FFS (94.38%) and non-FFS (85.55%) farmers had higher level of knowledge about physical destruction of pests. However, a large percentage of FFS farmers (62.80 %) had knowledge of insect trap benefits when compared to non-FFS farmers (24.35%). Similar situation existed in case of knowledge of line sowing for FFS (47.77%) and non-FFS farmers (15.49%). The data in Table-3 further show that the difference in knowledge level between FFS and non-FFS farmers was the highest in case of insect trap benefits (38.45%) followed by seed treatment (32.28%) and physical destruction of pests (8.83%). The study revealed that participation in FFS has helped them in enhancing the overall knowledge of mechanical control measures. The increase in knowledge level was high in case of insect trap benefits followed by clipping off seedling tips. The findings confirm with the findings of Dinpanab *et al.* (2010).

Biological control measures: With respect to biological control measures the knowledge level of FFS farmers was the highest in case of botanical pesticides (93.12%) followed by bio-pesticides (63.44%). In case of non-FFS farmers a similar situation existed with the knowledge level though they had relatively lower level of percentage of knowledge. A comparative analysis of knowledge level shows that both FFS (93.12%) and non-FFS (78.38%) farmers had high level of knowledge about botanical pesticides. However a large percentage of FFS farmers (63.44%) had knowledge of bio-pesticides while only 12.63 per cent of non-FFS farmers were aware of it. The data in Table 3 further show that the difference in knowledge level between FFS and non-FFS farmers was the highest in case of bio-pesticides (50.81%) followed by botanical pesticides (14.74%). The study showed that participation in FFS has helped them in enhancing the overall knowledge of biological control measures. The increase in knowledge level was high in case of bio-pesticides followed by botanical pesticides. The findings confirm with the findings of Yasavanth, *et al.* (2008) and Dinpanah, *et al.* (2010).

Chemical control measures: The investigation revealed (Table 3) that in case of FFS farmers with regard to chemical control measures the knowledge level was the highest in case of benefit of Economic

Threshold Level (66.35%) followed by benefit of seed treatment (56.91%), appropriateness of chemical pesticides (48.90%), registered plant protection products (42.89%) and awareness of banned chemical pesticides (36.31%). In case of non-FFS farmers with regard to chemical control measures the highest level of knowledge was found with respect to benefit of seedling root dip technique (21.37%) followed by appropriateness of chemical pesticide (16.66%), registered plant protection products (13.29%), awareness of banned chemical pesticides (11.69%) and benefit of Economic Threshold Level (10.43%), respectively. A comparative analysis of knowledge level shows that the benefit of seedling root dip technique was known to 56.91 per cent of FFS farmers while only 21.37 per cent of non-FFS farmers knew about it. Registered plant protection products were known to 42.89 per cent of FFS farmers while only 13.29 per cent non-FFS farmers were aware of it. Moreover, as much as 48.90 per cent of FFS farmers had knowledge of appropriateness of chemical pesticides when compared to 16.66 per cent of non-FFS farmers. Similar situation prevailed in case of knowledge of awareness of banned chemical pesticides for FFS (36.31%) and non-FFS farmers (11.69%). Further, a large percentage of FFS farmers (66.35%) had knowledge of economic threshold level when compared to only 10.43 per cent of non-FFS farmers. The data in Table 3 further show that the difference in knowledge level between FFS and non-FFS farmers was the highest in case of advantage of economic threshold level (55.92%), followed by benefit of seed treatment technique (35.54%), appropriateness of chemical pesticide (32.24%), registered plant protection products (29.60%) and awareness of banned chemical (24.62%). The study showed that participation in FFS has helped them in enhancing the overall knowledge of chemical control measures. The increase in knowledge level was the highest for advantage of economic threshold level followed by benefit of seed treatment technique, appropriateness of chemical pesticides, registered plant protection products and awareness of banned chemical pesticides. Similar findings were reported by Yaswanth *et al.* (2008) and Rustam (2010). Independent t-test was carried out to assess the significance of mean difference between FFS and non-FFS farmers in relation to knowledge about IPM

Table 4. Significance of mean difference between FFS and non-FFS farmers' knowledge about IPM practices

Components	FFS		Non-FFS		't' value
	Mean	SD	Mean	SD	
Cultural control measures	2.35	.932	1.90	.999	5.23**
Mechanical control measures	2.09	.987	1.62	.757	6.55**
Biological control measures	1.45	.578	1.10	.640	7.88**
Chemical control measures	2.16	1.945	1.16	1.152	8.96**

d. f. = (n-1) + (n-2) = 238

** Significance at 1 % level of significance

practices. Data in Table 4 reveal that the calculated' values of all the IPM practices such as cultural control measures (5.23), mechanical control measures (6.55), biological control measures (7.88) and chemical control measures (8.86) were greater than the theoretical value of 1.97 with 238 degree of freedom. Thus it is clear that there were significant mean difference between FFS and non-FFS farmers' knowledge about all IPM practices. The overall picture related to knowledge of Integrated Pest Management (IPM) practices showed that the participation of farmers in FFS has helped them in enhancing the knowledge of IPM related to cultural control measures, mechanical control measures, biological control measures and chemical control measures.

CONCLUSION

The investigation has revealed that the participation of farmers in FFS has helped them in overall knowledge of crop production practices related to integrated nutrient management, seed management and water management. Significant level of gain in knowledge also occurred in all the components of IPM practices such as cultural control measures, mechanical control measures, biological control measures and chemical control measures. The FFS methodology focuses on experiential learning where farmers learn through experimenting, observation and practical exercises. Further, farmers also learn through one another in a group situation. Thus it is clear that FFS methodology is a potential extension methodology to enhance farmers' knowledge which is a basis for adoption of improved

farming practices. Thus it can be concluded that FFS has enabled the farmers to enhance the knowledge related to ICM practices. The gain in knowledge has been experienced in all the areas of crop management practices. The findings also show the need for use of ICM methods as an important tool of extension to enhance farmers' knowledge which will become as basis for adoption.

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AN ASSESSMENT OF KNOWLEDGE OF WOMEN OF SLUM AREA REGARDING NEWBORN CHILD CARE IN JAIPUR

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ABSTRACT

Health of the future citizens depends on the care we are giving to our children today. Newborn babies constitute the foundation of life. Healthy and steady babies are likely to evolve as physically and mentally strong adults with enhanced quality of human resource development. Present study was an attempt to assess the knowledge and practices followed by slum area women regarding newborn care. The study was conducted at Sanjay nagar bhatta kachhi basti in Jaipur city. A total number of 50 women from selected slum area in the age of 15-45 and who had at least one child in the age of 0-28 days was selected for the study. The data were collected through structured interview schedule to assess their knowledge and practices regarding newborn care. Results reveal that majority of the slum area mother possessed low knowledge regarding various aspects like physical function, cord care, feeding etc of the newborn care. Further, it was also observed that slum area women poorly followed general hygiene, feeding and health care practices. Age, income, occupation and educational status of the respondents and ordinal position of newborn baby were significantly influenced the level of knowledge and practices followed by slum area women regarding newborn care.

INTRODUCTION

“Today’s children are tomorrow’s citizen”.

Health of the future citizens depends on the care we are giving to our children today. Newborn babies constitute the foundation of life. As rightly remarked by W.H.O. “A healthy child is nation’s pride”. A healthy child is one of the finest gifts of nature. A healthy adult emerges from a healthy infant. Healthy and steady babies are likely to evolve as physically and mentally strong adults with enhanced quality of human resource development. More than half of the infant’s death occurs in newborn period. Most of these deaths occur during first week of life. The major causes of these deaths are birth asphyxia, hypothermia and infection. Bacterial infections and septicemia account for about one fifth of the neonatal deaths. Neonatal bacterial infections are one of the leading causes of neonatal mortality in developing countries. In India, infant mortality rates are still high compared to developed countries. One million neonates die every year in our country. Neonatal deaths account for 63.7% of all infant deaths in India. India account for 27% of the global burden of neonatal deaths each year. It is recognized that to reduce infant mortality, health problems that occur

during the first month of life must be addressed as a high priority. Estimates of the cause of infant mortality indicate that severe infections account for 36% of which sepsis and pneumonia, tetanus, and diarrhoea account for 26%, 7% and 3% respectively.

The neonate period highly vulnerable period in which many psychological and physiological adjustments to life outside uterus must be made. The baby must be provided basic care to ensure its survival and optimum growth and development.

Mother Plays a key role in identify minor developmental deviations and early evidences of disease process because she is constantly and closely watching her baby. So she needs the basic knowledge and skills pertaining to mother craft, child nutrition (feeding), immunization, environmental sanitation, personal hygiene, and common problems in children. Insufficient knowledge of mother regarding new born care could lead to decrease quality of care and threaten neonatal health. But it is generally observed and available research studies revels that slum area women spent very little time for looking after their children. Child care is the most neglected activity for slum mothers. It is supported by Moran et al. (2009) studied on newborn care

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practices among slum dwellers in Dhaka, Bangladesh and reported that exclusive breastfeeding was rare among slum mother and most of women were giving their babies sweet water, honey and/or other foods before initiating the breast feeding. Hence, the present study was conducted to assess the knowledge and find out practices of slum area women regarding newborn care. After gaining ideas of the existing knowledge and practices of slum area women an interventional programme on knowledge regarding new born care can be planned to make them aware about adequate knowledge and practices regarding new born care.

RESEARCH METHODOLOGY

The present study was conducted in one purposely selected kachhi basti "Sanjay nagar bhata kachhi basti" in jaipur city. It is the biggest kachhi basti of jaipur city.

A sample of fifty slum area women in the age group of 15-45 years and who had at least one child in the age of 0-28 days was selected, purposely. Descriptive survey research design was used for the study. For data collection structured interview schedule was developed by the investigator to assess the knowledge and practices of women of slum area women regarding newborn child care. Two point scale test (dichotomous test) to measure the knowledge and practices regarding newborn care was used. The knowledge and practice score of each respondent were calculated by assigning marks for the correctly answered question. Each respondent scored 1 point for the correct response and 0 for the wrong responses. A maximum score of 37 was possible for knowledge test and maximum score of 31 was possible for practices test. Data were analyzed by using some suitable statistical measure.

RESULTS AND DISCUSSION

Table 1. Overall knowledge of respondents regarding newborn care

Categories	n=50	
	f	%
Low (<12)	29	58
Medium (12-24)	16	32
High (>37)	5	10
Total	50	100

Table 1 shows the percentage of sample with low, medium and high levels of knowledge. Table depicts that majority of respondents (58.00%) were in low levels of knowledge category followed by (32.00%) of the sample were at medium level of knowledge and only 10 per cent of respondents had high knowledge regarding new born care.

Table 2. Knowledge of respondent regarding various aspects of newborn care

No.	Aspects	No. of Respondents					
		Low		Medium		High	
		f	%	f	%	f	%
1	Physical function	23	46	22	44	5	10
2	Breastfeeding	27	54	17	34	6	12
3	Cord care	33	66	10	20	7	14
4	Personal hygiene	26	52	21	42	3	6
5	Maintenance of body temperature	39	78	9	18	2	4
6	Immunization	39	78	11	22	0	0

Table 2 present the information about distribution of respondents by their different aspects wise level of knowledge regarding newborn care.

Physical Function

The above table indicates that in aspect of physical function majority of the respondents (46%) were in category of low knowledge followed by (44%) had medium level knowledge whereas only (10%) of the respondents were in high knowledge category.

Breastfeeding

This table further reveals that majority of respondents (54%) had low knowledge regarding breast feeding, they did not know about meaning and importance of exclusive breast feeding, first fed of new born (colostrum), initiation of breast feeding within in one hour etc. .While (34%) of the respondents were found to posses medium knowledge and only (12%) of the respondents were found at high knowledge.

Cord care

The above table further indicate that in aspect of cord care, highest number of respondents were in

category of low knowledge (66%) followed by medium level knowledge whereas only 14 per cent of the respondents were in high knowledge category.

Personal hygiene

The table also shows that 52 per cent respondents were in low personal hygiene category followed by medium level knowledge (42%) and the least number of respondents had high personal hygiene knowledge (6%).

Maintenance of body temperature

The above table also shows information regarding aspect of maintenance of body temperature of newborn. It shows that highest number of respondents were in low knowledge category (78%) whereas (18%) of the respondents were found in medium level of knowledge category while only 4 per cent of the respondents possessed high knowledge regarding maintenance of body temperature of new born.

Immunization

Table further shows that maximum number of respondents (78%) were having low knowledge regarding immunization they were very poor in knowledge regarding meaning and importance of immunization, name of vaccine for prevention of particular disease. Followed by 22 per cent were having medium level of knowledge but no one found in high knowledge category regarding immunization of new born.

Table 3. Practices of respondents the regarding various aspects of newborn care

n= 50

No.	Aspects	No. of Respondents					
		Low		Medium		High	
		f	%	f	%	f	%
1	General hygiene	25	50	20	40	5	10
2	Bathing	36	72	12	24	2	4
3	Feeding	39	78	9	18	2	4

Table 3 shows the percentage of sample with low, medium, high levels of practices regarding different aspect of newborn care.

General hygiene

The above table indicates that highest number of respondents (50%) had low practice regarding general hygiene, they did not have good practices regarding various aspects of general hygiene like that hand washing before handling the newborn, keep the umbilical cord always clean , wash and clean napkins after each motion etc. (40%) were in medium and (10%) were having high level of practices regarding some dimensions of general hygiene like that they were drying the napkins under sunlight and were cleaning the genital area of new born after each defecation with water.

Bathing

The table also shows that (72%) of the total respondents were in low bathing practices category followed by (24%) had medium level practices and the least number of respondents had high feeding practices (4%).

Feeding

This table further reveals that (78%) of all respondents had low feeding practices, 18 per cent were having medium level of practices but rests of 4 per cent had the high feeding practices regarding new born.

Table 4. Overall practices of the respondents regarding newborn care

Categories	n=50	
	f	%
Low (>12)	29	58
Medium (12-24)	16	32
High (>37)	5	10
Total	50	100

Table 4 shows the percentage of sample with low, medium, high levels of practices. Table depicts that majority of respondents (58%) of the samples were in low levels of knowledge category followed by (32%) of the sample were in medium level of knowledge and only 10 per cent of respondents had high knowledge regarding new born care. It is supported by Sreeramareddy et al. (2006) and Aneja et al. (2007) it reveals that mothers followed high-risk traditional new born care practices like, delayed

in initiation of breast feeding, delayed wrapping, bathing, mustard oil massage, prelacteal feeding and discarding colostrums. Its need to be addressed by culturally acceptable community-based health education programs.

CONCLUSION

The result of the study revealed that majority of slum area women had low level of knowledge and practices regarding newborn care, and out of all selected aspects, in immunization aspect they had very poor knowledge and practices. It may be due to lack of awareness and educational intervention about proper newborn care practices. Therefore It can be concluded that there is need to improve knowledge and practices of slum area women regarding newborn care. Providing timely education in the form of intervention to the mothers could fill these gaps in knowledge and practices regarding newborn care practices. Study is also supported by Rahi et al. (2006) conducted a study on newborn care practices among primigravida mothers in an urban slum of Delhi (India). The results of the study reveals that more

than half of mothers were unaware of proper newborn care practices, thus there is an urgent need to reorient health care providers and to educate mothers on early neonatal care.

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EFFECT OF FOLIAR FERTILIZATION OF NPK ON WHEAT GRAIN YIELD AT FARMER'S FIELD

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ABSTRACT

A field study was conducted with the objectives to determine and demonstrate the effect of foliar spray of nitrogen, phosphorus and potassium on grain yield of wheat during Rabi 2010-11 at farmer's fields in Transitional Plain of Luni Basin of Rajasthan. Six different chemical fertilizers viz., 1% urea, 1% DAP, 1% soluble NPK, 0.5% KCl, 0.5% KNO₃ and 0.5% K₂SO₄ were applied at tillering and flowering stages along with farmer's practices. Yield enhancement due to foliar fertilization ranged between 9.88% with urea to 16.83% with soluble NPK. The foliar spray of DAP, KCl, K₂SO₄ and KNO₃ enhanced wheat grain yield by 12.62%, 12.08%, 13.67% and 14.13%, respectively. The maximum net benefit of Rs. 3057.60 per hectare was received with the foliar spray of soluble NPK, it was followed by DAP, urea and KCl with Rs. 2300.32, 1858.56 and 680 per hectare, respectively. The application of K₂SO₄ and KNO₃ enhanced grain yield by 13.67% and 14.13%, respectively but these two fertilizers were not found economical because of the higher cost of chemicals. Therefore, foliar spray of soluble NPK, DAP, urea and KCl at tillering and flowering stages may be promoted along with farmer's practice for enhancing the wheat productivity in Rajasthan.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most important food grain crop cultivated during rabi season. In Rajasthan, it has occupied an area of 2650548 hectare (average of 2008-09 to 2012-13) with annual production of 9227953 tonnes. It is grown in all parts of Rajasthan but major area has been covered by district Sriganganagar, Hanumangarh, Alwar, Bharatpur, Jaipur, Bundi, Baran and Kota. The average productivity of wheat in Rajasthan ranged between 1318 kg in district Barmer and 4238 kg/ha in district Bharatpur with the state average of 3362 kg/ha (Anonymous 2013-14). Foliar fertilization has become an established technology to enhance yield and improve quality of crop products. It also improves nutrient utilization and lower environmental pollution through reducing the amount of fertilizers added to soil especially wheat (Yaseen *et al.*, 2011). The efficacy of foliar fertilization is higher than that of soil fertilizer application under drought and salinity situations. The reasons for this are because of the supply of the required nutrient directly to the location of demand in the leaves and its relatively quick absorption (e.g. 0.5-2.0 h for N and 10-24 h for K), and the independence of root activity and soil water availability (Romheld and El-Fouly, 1999). Commercial fertilizers when applied during the period of low soil

moisture are rapidly absorbed through foliage and enhance crop yield and quality (Smith *et al.*, 1992). The judicious use of inorganic fertilizers can increase grain yield by 30-40 percent (Maqsood, *et al.*, 1999).

The N, P and K are major plant food nutrients and most of soils are deficient in these nutrients (Tahir, 1980). Adequate nitrogen must be supplied to crop during growing season for achieving their full yield potential (Angus *et al.*, 1998). Phosphorus counter balances the effect of excessive nitrogen by hastening plant maturity, improving grain quality and retarding excessive vegetative growth. It is also involved in many metabolic activities and if soil is deficient in phosphorus, the response of crop to nitrogen would be reduced (Senigagliesi *et al.*, 1983). At early growth stages, foliar fertilization could increase P and K supplies at a time when the root system is not well developed (Mallarino *et al.*, 2001). The foliar application of nutrients is more effective as compared to soil applied nutrients because of effective utilization by plant and minimum cost per unit area (Narang *et al.*, 1997).

The present study was conducted with the objectives to determine and demonstrate the effect of foliar fertilization of nitrogen, phosphorus and potassium on grain yield of wheat at farmer's fields.

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RESEARCH METHODOLOGY

Demonstrations on foliar fertilization of nitrogen, phosphorus and potassium in wheat were conducted during *Rabi* 2010-11 at farmer's fields in Transitional Plain of Luni Basin of Rajasthan. Six different commercially available fertilizers were applied individually along with farmer's practices. Demonstrations were conducted in three agro-ecological situations viz., irrigated normal soil and water, irrigated problematic soil and water, and cultivation on conserved moisture in low lying areas locally known as *Sewaj*. Foliar fertilizers were applied at tillering and flowering stages of wheat crop. Chemical composition and concentration of fertilizers applied in the demonstrations is given in Table-1.

The grain yield data of wheat received from farmer's fields was used to calculate the net benefit and benefit-cost ratio of foliar fertilization.

RESULTS AND DISCUSSION

Results revealed that foliar application of all six chemical fertilizers applied at tillering & flowering stages enhanced grain yield of wheat. Yield enhancement due to foliar fertilization ranged between 9.88% with urea to 16.83% with soluble NPK (Table-2). The foliar spray of DAP, KCl, K_2SO_4 and KNO_3 enhanced wheat grain yield by 12.62%, 12.08%, 13.67% and 14.13%, respectively. The maximum net benefit of Rs. 3057.60 per hectare was received with the foliar spray of soluble NPK, it was followed by DAP, Urea and KCl with Rs. 2300, 1859 and 680 per hectare, respectively (Table-3). The application of K_2SO_4 and KNO_3 was not found economical because of the higher cost of chemicals. Therefore, looking to the net benefit and benefit-cost ratio, foliar application of 1% soluble NPK, 1% DAP, 1% urea and 0.5% KCl at tillering and flowering stages may be promoted along with farmer's practice for

Table 1. Chemical composition and concentration of fertilizers applied to wheat

S. No.	Name of fertilizers	Chemical composition of the fertilizer	Concentration of fertilizer solution	Fertilizer solution applied in one spray
1	Urea	N-46%	1.0%	600 Litre
2	DAP	N-18%; P-46%	1.0%	600 Litre
3	Soluble NPK	N-19%; P-19%; K-19%	1.0%	600 Litre
4	KCl	K-52%	0.5%	600 Litre
5	KNO_3	K-38%; N-14%	0.5%	600 Litre
6	K_2SO_4	K-44%; S-18.60%	0.5%	600 Litre

Table 2. Grain yield of wheat as affected by foliar nutrition of chemical fertilizers

S.No.	Treatments	No. of farmer	Average gain yield (q/ha)		% Increase over control
			Treated	Control	
1	Foliar application of 1% urea at tillering & flowering stages	37	29.67	27.00	9.88%
2	Foliar application of 1% DAP at tillering & flowering stages	31	27.94	24.81	12.62%
3	Foliar application of 1% soluble NPK (19:19:19) at tillering & flowering stages	41	32.63	28.10	16.83%
4	Foliar application of 0.5% KCl at tillering & flowering stages	31	26.90	24.00	12.08%
5	Foliar application of 0.5% K_2SO_4 at tillering & flowering stages	31	27.28	24.00	13.67%
6	Foliar application of 0.5% KNO_3 at tillering & flowering stages	31	27.39	24.00	14.13%

Table 3. Economic analysis of different sources of foliar nutrition in wheat

No.	Name of chemical fertilizers	Fertilizer used in 2 sprays/ha	Fertilizer cost (Rs./ha) sprays/ha	Labour cost of 2 (Rs./ha)	Additional cost (q/ha)	Additional yield (Rs./ha)	Additional benefit (Rs./ha)	Net benefit (Rs./ha)	B:C Ratio
1	1.0% Urea	12 kg	51.84	1080	1131.84	2.67	2990.4	1858.56	2.64
2	1.0% DAP	12 kg	125.28	1080	1205.28	3.13	3505.6	2300.32	2.91
3	1.0% Soluble NPK	12 kg	936.00	1080	2016	4.53	5073.6	3057.60	2.52
4	0.5% KCl	6 kg	1488.00	1080	2568	2.9	3248	680	1.26
5	0.5% K ₂ SO ₄	6 kg	2700.00	1080	3780	3.28	3673.6	-106.4	0.97
6	0.5% KNO ₃	6 kg	2940.00	1080	4020	3.39	3796.8	-223.2	0.94

Note: Wheat price (Rs/q)- 1120 ; Labour cost of one foliar spray (Rs/ha)- 540

Fertilizer cost (Rs/kg): Urea-4.32, DAP-10.44, Soluble NPK-78, KCl-248, K₂SO₄-450, KNO₃-490

enhancing the wheat productivity in Rajasthan.

Njuguna *et al.*, 2011 also reported that foliar application of nitrogen through urea @ 20 kg/ha at tillering stage is beneficial to wheat crop under limited moisture condition in marginal areas of Kenya. Yaseen *et al.*, 2011 reported that foliar application of nutrient mixture of 1% N, 2% K₂O, 2.5% Zn, 1% Fe, 0.2% Cu, 1% B and 1% Mn improved straw and grain yield of wheat besides yield attributing characters like plant height, biological yield, harvest index, number of grains, grain weight, etc.

CONCLUSION

Foliar spray of 1% soluble NPK, 1% DAP, 0.5% KCl and 1% urea at tillering and flowering stages enhance the grain yield of wheat and found economical also. Therefore, the use of these fertilizers may be promoted at farmer's fields for augmenting the wheat production in Rajasthan.

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KNOWLEDGE LEVEL AND FACTORS ASSOCIATED WITH KNOWLEDGE GAIN REGARDING ENTREPRENEURIAL ACTIVITIES IN JHUNJHUNU DISTRICT OF RAJASTHAN

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ABSTRACT

Women entrepreneurs in the developing world make a large and often unrecognized contribution to their country's economic development. The support to women entrepreneurship will increase the level and status of women especially with reference to Indian condition. The present study was conducted in Jhunjhunu district of Rajasthan. It was concluded from the study that majority of the respondents (61.25%) had medium level of knowledge about different entrepreneurial activities. The education level, occupation, training, Cosmo politeness and economic motivation had positive and significant relationship with knowledge gain whereas, age of the respondents had negative and significant relationship with gain in knowledge. Family type, family size, landholding, and family income had no relation with knowledge gain of the respondents.

INTRODUCTION

Women entrepreneurs in the developing world make a large and often unrecognized contribution to their country's economic development. They employ other people, provide valuable services and play vital role in the development of emerging market economy worldwide. The government and semi-government organizations are playing an important role in mobilizing women to become entrepreneurs. The support to women entrepreneurship will increase the level and status of women especially with reference to Indian condition.

Women entrepreneurs may differ according to location, culture, ethics, background, economic policies and other such influential factors, but the challenges for them remain essentially the same. The age of technology has brought tremendous change and tremendous potential for the extension educators. Educators have made available media package for daily use, which assists in creating learning opportunities even for bearers situated great distance away. The present study Knowledge Level and Factor Associated with Knowledge Gain Regarding Entrepreneurial Activities in Jhunjhunu District of Rajasthan was undertaken with following specific objectives.

1. To study the existing knowledge level of rural

women regarding different entrepreneurial trades.

2. To find out the factors affecting the gain in knowledge regarding entrepreneurial activities.

RESEARCH METHODOLOGY

The present study was conducted in Jhunjhunu district of Rajasthan. There are 8 blocks in Jhunjhunu district, out of which 4 blocks namely; Alsisar, Jhunjhunu, Udaipurwati and Khetri were selected randomly for the study. A list of villages was prepared from selected block where entrepreneurial activities were running. More or less villages were homogenous in nature as far as entrepreneurial activities are concerned. Therefore, four villages from each identified blocks were selected by applying simple random sampling techniques. A list of women entrepreneurs from each selected village was prepared and 10 respondents were selected randomly from each identified village. Thus, total 160 respondents from 16 villages were included in the sample size as follows.

A schedule was developed to measure the level of knowledge of respondents about women entrepreneurs. The 40 questions in objective form i.e. alternative, multiple choice and dichotomous type

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covering all aspects of women entrepreneurs were included in the schedule and frequency, percentage and mean percent score were calculated. The association of independent variables i.e. age, education, family income, type of family, family size, land holding, family occupation, training cosmopolitaness and economic motivation of the respondents with knowledge gain was measured by applying correlation coefficient and 't' test.

$$\text{Mean percent score (MPS)} = \frac{\text{Total score obtained by the respondents}}{\text{Maximum obtainable score}} \times 100$$

RESULTS AND DISCUSSION

Existing knowledge level of the respondents

Data presented in Table 1 reveals that the highest score obtained by the respondents was 20 and lowest was 12 with a range of 8 and coefficient of range 0.25. Standard deviation at pre-test was 2.36 and coefficient of variation was 15.29 per cent.

Table 1. Score range of knowledge and standard deviation in pre test

Range of knowledge	Coefficient of range	Average score	Standard deviation	Coefficient of variation
12-20 (8)	0.25	15.44	2.36	15.29

Distribution of respondents on the basis of their existing knowledge level

Perusal of the Table 2 shows that majority of the respondents (61.25%) had medium level of knowledge with mean per cent score of 52.00 about different entrepreneurial activities. Further 29.37 per cent respondents have low level of knowledge with 26.75 mean per cent score. Only 9.38 per cent respondents had high level of knowledge with mean per cent score of 64.00

Table 2. Distribution of respondents on the basis of their existing knowledge level

Knowledge level with score range	Frequency	%	Mean % score
Low (< 13.8)	47	29.37	26.75
Medium (13.8-17.80)	98	61.25	52.00
High (above 17.80)	15	09.38	64.00

Relationship between knowledge gain and independent variables

Age

Table 3 shows that the calculated 't' value is higher than tabulated value at 0.01 level of significance. Hence age significantly influenced the gain in knowledge. Table also depicts that there is negative correlation between age and gain in knowledge, meaning that as age increases gain in knowledge decreases. Young people are more open to new ideas than the old ones.

Education

Table 3 indicates that with respect to education the calculated 't' value is higher than the tabulated value at 0.01 level of significance. Therefore, It is clear that education influence the knowledge gain. Table also reveals that the relationship is positive meaning that knowledge gain increases with an increase in education level.

Family type

The data presented in Table 3 depicts that the calculated 't' value is less than the tabulated value at 0.05 level of significance. Thus, it can be said that there is no relationship between family type and gain in knowledge.

Family size

It is clear from the data as presented in Table 3 that the calculated 't' value is less than the tabulated value at 0.05 level of significance. Hence family size had no influence on gain in knowledge.

Family occupation

The data present in Table 3 clarifies that the calculated 't' value is higher than the tabulated value at 0.05 level of significance. It means family occupation is positively associated with knowledge gain. This might be due reason that engagement of respondents in different occupations may increase their motivational level and motivated them to gain extra information from different other sources regarding women entrepreneurship.

Land holding

It can be revealed from the Table 3 that

Table 3: Relationship between knowledge gain and independent variables

S.No.	Independent variables	Calculated	Calculated 't' value	't' tabulated Value	't' value
1.	Age	-0.236**	-3.050	0.01	2.607
2.	Education level	0.419**	5.807		
3.	Family type	-0.057 NS	-0.714		
4.	Family size	-0.020 NS	-0.249		
5.	Occupation	0.196 *	2.513		
6.	Land holding	-0.108 NS	-1.367	0.05	1.975
7.	Family income	0.143 NS	1.814		
8.	Training	0.361**	4.867		
9.	Cosmopolitaness	0.337**	4.505		
10.	Economic motivation	0.267**	3.488		

* Significant at 0.05 level of significance

** Significant at 0.01 level of significance ,

NS- Non significant

landholding had a non significant association with gain in knowledge because the calculated 't' value is less than the tabulated value at 0.05 level of significance.

Family income

Table 3 indicates that regarding family income the calculated 't' value is less than the tabulated value of level of significance. Hence, family income did not influence knowledge gain.

Training

It is seen in Table 3 that the calculated 't' value is higher than the tabulated value at 0.01 level of significance. Thus there is significant relationship between training and gain in knowledge and table also indicates that the relationship is positive.

Cosmopolitaness

It is seen in Table 3 that the calculated 't' value is higher than the tabulated value at 0.01 level of significance. Thus there is significant relationship between training and gain in knowledge and table also indicates that the relationship is positive. It means more cosmopolitan respondent had gained more knowledge.

Economic Motivation

It is seen in Table 3 that the calculated 't' value is

higher than the tabulated value at 0.01 level of significance. Thus there is significant relationship between economic motivation and gain in knowledge and table also indicates that the relationship is positive. It means more economically motivated respondent had gained more knowledge.

These findings are in conformity with the findings of Dudi (2005), Meena, D. K. (2010), Kaur, R. (2011).

CONCLUSION

It was concluded from the study that majority of the respondents (61.25%) had medium level of knowledge about different entrepreneurial activities. The education level, occupation, training, Cosmopolitaness and economic motivation had positive and significant relationship with knowledge gain whereas, age of the respondents had negative and significant relationship with gain in knowledge. Family type, family size, land holding, and family income had no relation with knowledge gain of the respondents.

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ANALYSIS OF CONSTRAINTS FACED BY Bt COTTON GROWERS IN MANSA DISTRICT OF PUNJAB

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ABSTRACT

Total 25 villages were randomly selected from all the five blocks of the district Mansa. A sample size of 125 small farmers was purposely selected for this study. The constraints as perceived by the respondents were scored on the basis of the magnitude of the problem viz; very serious (2), serious (1) and somewhat serious (0). The results indicated a fair level of education among the small cotton farmers in the study area. Land holding of majority of the respondent farmers (63.20 %) was between 1-2 hectares and majority has farming experience within 20-30 years. Control of sucking pests, plant population, sowing of refuge and seed soaking were practices where extent of adoption was very low with 19.17, 7.50, 6.67 and 4.58 MPS, respectively. Major socio-economic constraints were high cotton picking and seed costs. Poor quality of underground water was perceived as very serious situational constraint by 61.6 per cent of the small farmers followed by 24.8 per cent who perceived this as serious constraint. Among the technological constraints, high incidence of whitefly (*Bemisia tabaci*) sucking pest was perceived as very serious pest by 71.2 per cent of the respondent farmers. The incidence of whitefly is major limiting factor in enhancing yields of Bt cotton hybrids as it acts as vector of leaf curl virus. Parawilt was perceived as very serious technological constraint by 67.2 per cent of the farmers with MPS of 83.75 and was ranked at IInd. Based on the study it was concluded it was necessary to intensify the extension efforts to increase their knowledge level and adoption of recommended cotton technologies.

INTRODUCTION

In South western districts of Punjab cotton is among one of the major crop and plays an important role in income generation among farmers and traders. In 1990s cotton growers were in distress due to devastating pest American bollworm. Introduction of Bt cotton in 2002 made the revolution in cotton cultivation. Cotton helped in containing the most damaging pests in cotton; Adoption of BT cotton was very fast due to its resistance against three major pests of cotton viz; American bollworm (*Helicoverpa armigera*), Pink bollworm and Spotted bollworm (*Earias spp*). Soon the introduction of Cotton BG II hybrids of cotton relieved the farmers from the attack of tobacco caterpillar (*Spodoptera spp.*) also. Presently more than 99 % per cent area is under Bt cotton hybrids in Punjab. Even with initial leaps in adoption and profit earnings, soon the cotton was in controversies due to use of un-recommended seeds, attack of sucking pests like whitefly (*Bemisia tabaci*) and jassid (*Amrasca biguttula*), problem of parawilt and other problems viz; irrational use of fertilizers and insecticides etc (Padaria *et al* 2009). Various

extension agencies government or private are continuously making efforts to educate the farmers about the scientific cultivation practices in cotton so that farmers may adopt the technologies and could enhance their income. Poor adoption of scientific cotton production techniques by farmers would eventually lead to high input costs with corresponding low yield. But, if farmers adopt and apply the improved techniques well, there will be increase in productivity. Hence, to promote adoption, there is a need to the constraints faced by small farmers in cotton cultivation in district Mansa. Therefore, the present study regarding “Analysis of constraints faced by small Bt cotton growers in Mansa district of Punjab” was conducted”.

The main objective of the study was to analyze constraints faced by the small cotton growers in cotton production technologies in district Mansa. The specific objectives were to:

- i. to identify the socio-economic characteristics of cotton farmers in the study

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area;

- ii. to find out the constraints faced by the cotton growers in the adoption of improved cotton production technologies.

RESEARCH METHODOLOGY

The study was conducted during the year 2013-14 in operational area of Krishi Vigyan Kendra Mansa. Data were collected from all the five blocks viz ; *Mansa, Budhladha, Bhikhi, Sardulgarh* and *Jhunir* of district Mansa. From each block total five villages were randomly selected, thus total 25 villages were selected for purpose of data collection. From each selected village five small farmers were purposely selected that comprised the total sample size of 125 small farmers. For the collection of data an interview schedule was developed. The constraints faced by the small cotton growers were recorded on the three point continuum namely very serious, serious and somewhat serious and the scores were assigned 2, 1, 0, respectively. The responses were calculated accordingly. For the purpose of data analysis frequencies, percentages, and mean scores very calculated. Ranking of the recommended practices was done based on extent of adoption and constraints were ranked according to degree of severity.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Farmers

The socio-economic characteristics of the respondents studied included; Age, Education, Land holding, Farming experience, Extension contact, Mass media exposure and Social participation. These are presented in Table 1. The results indicated that majority (53.60 %) of the respondents were within age range of 30-50 years old, indicating that the people involved in cotton farming were more than average in terms of age.

Table 1 further shows that most of the respondents (61.60 %) acquired formal education upto middle level. The results indicated a fair level of education among the small cotton growers in the study area which could have a great impact on adoption of improved cotton technology. Land holding of majority of the respondent farmers (63.20 %) was between 1-2 hectares. Table 1 also indicated that about fifty per cent of the respondents were

having farming experience within 20-30 years.

Table 1. Socio-personal characteristic of respondent farmers

(n = 125)			
No.	Personal Characteristics	No of Respondents	%
1.	Age		
	<30	15	12.00
	30-50	77	61.60
	>50	33	26.40
2.	Education		
	Low (Upto Primary)	44	35.20
	Medium (Middle to High School)	77	61.60
	High (Above High School)	4	3.20
3.	Land holding		
	Marginal (> 1.0 ha)	46	36.80
	Small (1.0 ha -2.0 ha)	79	63.20
4.	Farming experience		
	1-10 years	8	6.40
	10-20 years	44	35.20
	20-30 years	63	50.40
	> 30 years	10	8.00
5.	Extension contact		
	Low	56	44.80
	Medium	62	49.60
	High	7	5.60
6.	Mass media exposure		
	Low	64	51.20
	Medium	52	41.60
	High	9	7.20
7.	Social participation		
	No membership of organizations	101	80.80
	Membership of some of the organizations	24	19.20

Low level of adoption among older farmers may be due to built up ideas and practices which are difficult to change. About fifty per cent of the respondent farmers were having medium extension

contact followed by 44.80 per cent with low extension contact. Enhancing extension contact with these small farmers could further result in increase in adoption of recommended practices among small farmers. It was found that marginal farmers (<1 hectare land holding) were having very low extension contact with the extension agents. Similarly, mass media exposure of majority respondents (51.20 %) was also low followed by 41.60 per cent with low mass media exposure. Only 7.20 per cent of the respondent farmers had high mass media exposure. More than eighty per cent (80.80 %) respondent farmers were having no membership of any social organization.

CONSTRAINTS FACED BY SMALL FARMERS IN COTTON CULTIVATION

The data regarding this aspect have been presented in Table 2. A cursory look at the data explains that high seed cost was the major reason for average extent of adoption of recommended cotton hybrids. More than seventy per cent (70.40 %) of the respondent farmers considered it very serious constraint. Majority of small farmers tends to buy cheap un-recommended seeds that resulted in poor yields. Therefore, there is a need to motivate the farmers regarding the importance of quality seeds and cooperative purchase of agricultural inputs. It is very difficult for small farmers to afford picking costs and that's why it was ranked as Ist. Other socio-economic constraints are high labour cost and cheating by seed dealers.

Poor quality of underground water was perceived as very serious situational constraint by 61.6 per cent of the small farmers followed by 24.8 per cent farmers who perceived this as serious constraint. More than fifty per cent (52.0) of the respondent farmers perceived that burning of cotton seedlings as very serious constraint that resulted in poor plant population and thus affecting the yields. These farmers should be advised mix canal water with tubewell for irrigating the fields. Farmers should also be advised to use canal water during rauni so that problem of burning of young seedling may be checked. Similarly, poor fertility soils and problematic soils were also considered as very serious situational constraint by about 50 per cent of the respondent

farmers. These situational constraints were affecting the yields of the farmers and it was very difficult to manage these constraints.

Among the technological constraints, severe attack of whitefly (*Bemisia tabaci*) sucking pest was perceived as very serious constraint by 71.2 per cent of the respondent farmers followed by 20.8 per cent who considered it as serious constraint. The incidence of whitefly is major limiting factor in enhancing yields of cotton hybrids as it acts as vector of leaf curl virus. High incidence of whitefly also results in high input costs as farmers had to use chemical sprays for control of this pest. Due to this reason, MPS for whitefly was 85.00 and was ranked as first among technological constraints. Parawilt was perceived as very serious technological constraint by 67.2 per cent of the farmers with MPS of 83.75 and was ranked at IInd. To demonstrate the importance of technology front line demonstrations must be conducted at farmers' field. Patel *et al* (2013) suggested that "*conducting front line demonstrations of proven technologies, yield potential of cotton can be increased to a great extent. This will substantially increase the income as well as the livelihood of the farming community*".

Small farmers were not very much aware about the use of cobalt chloride used for control of parawilt due to their poor extension and mass media contact. Weed infestation and poor yields of refuge seed were also major technological constraints. Weed infestation enhanced input costs on hoeing and chemical weed control while poor refuge yields resulted in almost nil adoption of growing refuge plants around cotton hybrids which are desirable for insect pest resistance management. Fear of low yields on leased in lands resulted in use of heavy doses of fertilizers and insecticides.

Unawareness of government supplies and services at proper time was the major institutional constraints and was perceived as very serious by 77.6 per cent of the farmers. It was ranked as Ist with total score of 215 and MPS of 89.58. Lack of timely supply of fertilizers was perceived as very serious constraint by 62.4 per cent of the respondent farmers. Similar findings were reported by Rai and Singh (2012). Lack of awareness regarding recommended

Table 2. Constraints perceived by small farmers in Cotton cotton production technologies

No. Particulars	Very Serious		Serious		Somewhat serious		Total Score	Mean Score	Mean %	Rank Order score
	f	%	f	%	f	%				
A. Socio-economic Constraints										
1. High seed cost	88	70.4	27	21.6	10	8.0	203	1.69	84.58	II
2. High picking cost	94	75.2	32	25.6	1	0.8	220	1.83	91.67	I
3. Cheating by seed dealers	90	72.0	22	17.6	13	10.4	202	1.68	84.17	IV
4. High labour cost	92	73.6	29	23.2	4	3.20	213	1.78	88.75	II
B. Situational Constraints										
5. Poor quality underground water	77	61.6	31	24.8	7	5.6	185	1.54	77.08	I
6. Poor fertility soils	64	51.2	42	33.6	19	15.2	170	1.42	70.83	II
7. Problematic soils	63	50.4	36	28.8	26	20.8	162	1.35	67.50	IV
8. Burning of plants due to high temperature	65	52.0	35	28.0	25	20.0	165	1.38	68.75	III
C. Technological Constraints										
9. High incidence whitefly	89	71.2	26	20.8	10	8.0	204	1.70	85.00	I
10. High incidence of parawilt	84	67.2	33	26.4	8	6.4	201	1.68	83.75	II
11. High weed infestation	74	59.2	42	33.6	9	7.2	190	1.58	79.17	III
12. Poor yields of refuge seeds	64	51.2	50	40.0	11	8.8	178	1.48	74.17	IV
D. Institutional Constraints										
13. Unawareness of government supplies and services at proper time	97	77.6	21	16.8	7	5.6	215	1.79	89.58	I
14. Lack of timely supply of fertilizers	78	62.4	25	20	22	17.6	181	1.51	75.42	IV
15. Lack of proper irrigation facility	85	68.0	31	24.8	9	7.2	201	1.68	83.75	III
16. Lack of awareness of recommended seeds	90	72.0	27	21.6	8	6.4	207	1.73	86.25	II

seeds was second major institutional constraint. To create awareness small farmers must be reached using information communication technologies viz; mobile phones.

I. Category-wise constraints as perceived by the small farmers

Overall category-wise ranking of perceived constraints was also studied and has been presented in Table 5. It was found that category of socio economic constraints with total score of 209.5 (MPS =87.29) was the top ranked category as perceived by

the small cotton growers. It means that socio-economic problems hindering the adoption of recommended practices are on higher side. This was followed by the institutional constraints having total constraint score of 201.0 (MPS = 83.75), technological constraints (MPS =193.3) and situational constraints (MPS = 71.04), respectively. Discussion with the small farmers also revealed that socio-economic constraints and institutional constraints effects the technology adoption, therefore major emphasis should be overcoming constraints regarding these two aspects for the development of small farmers.

Table 3. Category-wise constraints as perceived by the small farmers in cotton cultivation

S.No	Particulars	Total Score	Mean Score	Mean Per cent score	Rank Order
A.	Socio-Economic Constraints	209.5	1.75	87.29	I
B.	Situational Constraints	170.5	1.42	71.04	IV
C.	Technological Constraints	193.3	1.61	80.52	III
D.	Institutional Constraints	201.0	1.68	83.75	II

CONCLUSION

On the basis of findings it was concluded that among socio-economic constraints high picking cost was observed as most serious constraints. It was also concluded that among technological constraints high incidence of whitefly was major constraints whereas poor yields of refuge was considered as least serious constraint. In case of institutional constraints Unawareness of government supplies and services at proper time was observed as most serious constraint followed by lack of awareness of recommended seeds. Regarding situational constraints poor quality underground was perceived as major constraint and was ranked as Ist. While analysing overall constraints as perceived by the small farmers, the study highlighted those socio-economic constraints is the major hindrance in adoption of recommended cotton cultivation practices, followed by institutional constraints. Based on these findings it can be suggested that small farmers needs economic development and institutional support for their overall development. Extension agencies should focus on these farmers for transfer of knowledge and skill and overcoming psychological constraints regarding over adoption

of input use viz; fertilizers, weedicides, insecticides and fungicides. Local specific technologies should be developed to overcome the problems regarding situational constraints.

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ADOPTION BEHAVIOUR OF SORGHUM GROWERS IN KHARGONE DISTRICT OF MADHYA PRADESH

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ABSTRACT

The study was conducted in Khargone district of M.P. A representative sample of 120 sorghum growers was drawn from ten randomly selected villages of two selected blocks. The data were collected from the respondents by using an interview schedule, which was pre tested before actual application. The study revealed that about 92 per cent of the respondents had full adoption of preparation of land and about, 97 per cent of the farmers had full adoption about showing time of sorghum. About 90 per cent had soil depth, on the other hand about 99 per cent of respondents had partial adoption in case of weed management and 91 per cent of recommended variety, 83 percent respondents had partial in case of seed rate. The study also indicated the majority of the respondents did not adopt the seed treatment practices, disease management & insect management.

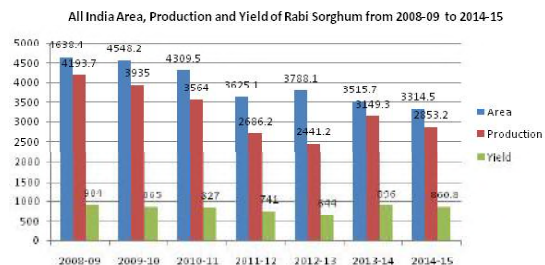
INTRODUCTION

Sorghum is the fifth most important cereal staple crop in the Sub-tropical and some arid regions of Africa and Asia. It is the second cheapest source of energy and micronutrient after Pearl Millet. The vast majority of the population in Africa and Central India is depending on it for their dietary and micro-nutrient requirements.

In Sorghum, the cultivation area is showing a decreasing trend and the reduction is to the extent of 41.81 per cent from the year 2008-09 to 2014-15 and a decline 74.71 per cent was recorded over the past four decades in the country. The major Sorghum growing States in the country are Maharashtra, Karnataka, Rajasthan, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. But, all the States are showing a decreasing trend in the area of cultivation under Sorghum with the exception of Tamil Nadu which has registered an increase of more than 63 per cent over the base year of 2008-09. However, in spite of reduction in the area, all States have recorded a substantial increase in the productivity and the extent of increase was highest in the Madhya Pradesh (14.95 q/ha), followed by Tamil Nadu (13.79 q/ha), Andhra Pradesh (13.58 q/ha), Gujarat (12.47 q/ha), Karnataka (11.43 q/ha) and Maharashtra (6.08 q/ha) Tamil Nadu (10.5 q/ha), respectively.

RESEARCH METHODOLOGY

The study was conducted in Khargone district of Madhya Pradesh. Sorghum is an important crop of this district and is being grown in about 56.0 thousand hectares of land spread over nine blocks of the district namely, Khargone, Bhikangone, Badwah, Kasrawad, Mahesware, Gogawa, Jhirnya, Sengawa and Sendhwa. Descriptive research design was used to describe the characteristics of sorghum growers and analyze the relationship of socio-economic, communication and psychological variables (independent variable) with adoption behavior (dependent variable) of sorghum growers. Out of these nine blocks, two blocks namely Bhikangone and Badwah were selected randomly. From each selected block, a list of villages was prepared and ten villages (five villages from each block) were selected randomly. A list of all the sorghum growers from each of the selected village was also prepared. From this list, 12 respondents were randomly selected to make the total sample size of 120 respondents.



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RESULTS AND DISCUSSION

Practice-wise adoption of sorghum production technology by sorghum growers

The adoption of sorghum production technology was analyzed and ten practices were delineated for the study *viz.*, preparation of land, use of recommended varieties, seed treatment with fungicide, time of sowing, use of recommended spacing, sowing depth, seed rate, weed management, insect management and disease management.

In order to ascertain adoption of improved sorghum production technologies, the responses of the respondents were collected on ten practices. Practice-wise responses were categorized in to three level of adoption i.e. no adoption, partial adoption and complete adoption. The responses received on the adoption behavior in respect of various sorghum production technologies were analyzed and the results are presented in Table 1.

The data incorporated in Table 1 reveal that vast majority (91.66%) of the respondents had complete adoption in case of recommended land preparation practices followed by soil depth (90%) and time of sowing (96.66%).

It was further noted that about 99.66% of the respondents had partial adoption in case of weed management and use of recommended variety (91.66%). About 83.33 per cent respondents had partial adoption in case of seed rate.

The data also revealed that majority (100%) of the respondents did not adopt seed treatment practice and disease management (100%) and insect management (100%).

Level of adoption behavior of sorghum growers

Adding individual scores received on different practices studied the level of adoption in respect of improved sorghum production technology. According to the total score obtained, the respondents were categorized into three group's low, medium and high level of adoption and results are presented in Table 2

The data indicated that maximum numbers of respondents (94.16%) were observed to have medium level of adoption, while about 3.33 per cent had high and 2.5 per cent had low level of adoption. The mean adoption score value was 10.075. The findings of the study was in agreement with the results obtained by Patel (1994).

Table 1: Practice-wise adoption of the sorghum production technology by sorghum growers.

					n=120
S. No	Recommended Technology	Complete adoption	Partial adoption	No adoption	Rank
1.	Preparation of land	110(91.66)	10(8.33)	0(0)	II
2.	Use of recommended varieties	0(0.0)	110(91.66)	10(8.33)	VI
3.	Time of sowing	116(96.66)	3(2.5)	1(0.83)	I
4.	Spacing	20(16.66)	90(75)	10(8.33)	IV
5.	Weed management	0(0.0)	119(99.16)	1(0.83)	IV
6.	Sowing depth	108(90)	10(8.33)	2(1.66)	III
7.	Insect management	0(0.0)	0(0.0)	120(100)	VII
8.	Seed rate	10(8.33)	100(83.33)	10(8.33)	V
9.	Disease management	0(0.0)	0(0.0)	120(100)	VII
10.	Seed treatment	0(0.0)	0(0.0)	120(100)	VII

(The figures in parentheses are percentage of the total)

Table 2. Level of adoption behavior of sorghum growers

n=120				
No. Adoption level	No of respondents	%	Mean	SD
1. Low (>9 Scores)	03	02.5	10.075	0.7577
2. Medium (9-11 Scores)	113	94.16		
3. High (>11 Scores)	04	03.33		

Table 3: Correlation between socio-economic, communication and psychological characteristics of the respondents and their adoption behavior

No. Characteristics	Correlation Coefficient "r"
1. Age	-0.040
2. Education	0.063
3. Social Participation	0.203*
4. Socio economic status	-0.002
5. Economic motivation	0.011
6. Risk preference	-0.181*
7. Extension participation	0.000
8. Information seeking behavior	0.063
9. Cosmopolitness	-0.211*

* Significant at 5% level of significant

** Significant at 1% level of significant

The correlation matrix table reveals that the age has non significant with 1 percent level of adoption. While, social participation has positive and significant at 5 percent level of significance with adoption behavior, whereas economic motivation has negative significant at 5 percent level with adoption. Whereas risk preference is also negative significant with adoption behavior at 5 percent level of adoption and cosmopolitness is also negative correlated at 5 percent level with adoption behavior.

Other factors like social participation were found to be positively correlated with adoption behavior. And cosmopolitness and risk preference had negative correlated with adoption behavior.

Multiple regression analysis of socio-economic,

communication and psychological factors and adoption behavior

In the preceding presentation of the results, each one of, socio-economic, communication and psychological factors were hypothesized to have an amount of relationship with adoption behavior. Thus, the relationship was expressed in term of zero order correlation coefficients.

The prediction of adoption behavior through socio-economic, communication and psychological factors was carried out by multiple regression analysis. The standard partial regression coefficient, their percentile contribution and regression coefficient "b" values obtained at this step are furnished in Table 4.

The analysis indicated that all the nine variables taken together explained 10.40 per cent of the variation ($R^2 = 0.014$) for adoption behavior of sorghum growers. The "F" value 0.17 was significant at 1 per cent level of probability. The result implied that all the variables accounted for significant amount of variation for adoption behavior.

Table 4. Regression analysis of selected characteristics of sorghum growers with their adoption behavior

No. Factors	Standard partial regression coefficient	T value	Probability
1. Age	-0.0041	-0.031	0.975
2. Education	0.523	4.396	0.693
3. Social-participation	-0.0795*	-0.814	0.017
4. Socio-economic status	0.0029	0.031	0.975
5. Economic motivation	0.0132	0.136	0.892
6. Risk preference	-0.187*	-2.019	0.035
7. Extension participation	0.0075	0.078	0.938
8. Information Seeking	0.0692	0.719	0.473
9. Cosmopolitness	-0.235*	-3.237	0.028

$R^2 = 0.014$ F-value=0.17**

*Significant at 5% level of significance

** Significant at 1% level of significance

Further it was observed that 't' test of significance expressed in coefficients of regression 'b' values in which social participation risk preference and cosmopolitanism is significant at 5 per cent level of probability and there were no significant at 1 per cent level of probability.

On the contrary, coefficient of regression "b" values were no significant for age, education, socio-economic status, economic motivation, information seeking, and extension participation.

CONCLUSION

It can be concluded that about ninety nine per cent of respondents had partial adoption in case of weed management and ninety one percent of recommended variety, eighty three percent respondents had partial adoption in case of seed rate. The study also indicated that majority of the respondents did not adopt the seed treatment practices, disease management and insect management.

As regards the overall adoption level of the sorghum growers the result revealed that 94 per cent of the respondents had medium level of adoption, while about 3.33 per cent had high and 2.5 per cent had low level of adoption.

The study revealed that out of ten variables, one variable social participation had positive and significant relationship with adoption behavior, whereas risk preference and cosmopolitanism had negative and significant relationship with adoption behavior. The analysis indicated that all the nine variables taken together explained 10.40 per cent of the variation for adoption behavior of sorghum growers. The result implied that all the variables accounted for significant amount of variation for adoption behavior.

Further it was observed that 't' test of significance expressed in coefficients of regression 'b' values were negative significant for social participation,

risk preference and cosmopolitanism.

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SKILL DEVELOPMENT LEVEL OF THE PARTICIPATING SCIENTISTS REGARDING ICAR SPONSORED TRAINING COURSES

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ABSTRACT

The study was conducted in four selected universities where Summer/Winter schools during 2013-14 and 2014-15 have been organized were the locales of the present investigation. Data were collected from 31 respondents through mailed questionnaire. There were four types of respondents viz. Participatory Extension Research and Management (PERM), Agri-Business and Marketing Opportunities and Challenges (ABMO), Drudgery Reduction Technologies for Farm Women and Farm Worker to Enhance Efficiency, Productivity and Occupational Safety in Agriculture (DRT) and Decision Support System in Agriculture Using Quantitative Techniques (DSS). Results indicated that altogether 29 (93.55 per cent) participants possessed high level of skill development towards ICAR Sponsored Training Courses followed by 2 (6.45 per cents) and nil per cent who expressed respectively moderate and low skill development towards ICAR Sponsored Training Courses, PERM comparatively visualized encouraging skill development compared with DRT. Equal participants i.e. 5 (17.24 per cent) ABMO and DSS expressed high skill development, majority of them were under low and moderate. It is recommended that the ICAR Sponsored Training Courses must be continued as majority of participants fell under high level of skill development about the ICAR Sponsored Training Course.

INTRODUCTION

Since 1967, the Indian Council of Agricultural Research has been sponsoring the Summer Institute / Short Courses (Now re-named as Summer Schools / Winter Schools / Short Courses) in different disciplines of Agriculture, Veterinary, Animal Sciences, Home Science and Fisheries in Agricultural Universities/ ICAR Institutes. The purpose of organizing Summer Schools / Winter Schools / Short Courses is to bring about the qualitative improvement and to update the teachers, researchers and extension specialists in the latest knowledge and techniques in the field problems, to provide a common forum for co-professionals to interact and exchange experiences and also to maintain a feedback to make research, extension and education more relevant. SAUs in India are committed for three fold functions, namely teaching, research and extension. Effectiveness and efficiency of the scientists engaged in these three functions of SAUs and ICAR institutes largely depends on their time-to-time trainings through Summer/Winter schools which are of 21 day long duration.

RESEARCH METHODOLOGY

The investigation was carried out in four selected universities where Summer/Winter schools during 2013-14 and 2014-15 have been organized were the locales of the present investigation with the specific objective to effectiveness of ICAR Sponsored Training Courses of Social Sciences. It was performed based on knowledge accumulated among the agricultural scientists in the subject of their concerned areas in training courses.

Out of total 31 participants four winter/Summer Schools viz. PERM, ABMO, DRT and DSS were covered under study. Therefore, as such, these four winter/ summer Schools were included in the present investigation.

Two 21 day training courses for the year 2013-14 and, similarly two training courses of the year 2014-15 were selected. That way, total four ICAR sponsored 21 day training courses were chosen for the present study. Since the knowledge level of participants in training courses had to be compared among the four winter/summer Schools. Total size of

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Table 1. Distribution of respondents on the basis of their level of skill development on account of training course

Level of Skill Development	n=31				
	PERM(n ₁ =11)	ABMO(n ₂ =5)	DRT(n ₃ =9)	DSS(n ₄ =6)	Total(n=31)
Low<18.33	0 (0.00) 0.00*	0 0.00*	0 (0.00) 0.00*	0 (0.00) 0.00*	0 (0.00)
Moderate18.33-36.67	0 (0.00) 0.00*	0 (0.00) 0.00*	1 (50.00) 11.11*	1 (50.00) 16.67*	2 (6.45)
High>36.67	11 (37.93) 100.00*	5 (17.24) 100.00*	8 (27.59) 88.89*	5 (17.24) 83.33*	29 (93.55)
Total	11 (100)	5 (100)	6 (100)	9 (100)	31 (100)

n= Total No. of respondent, n₁= respondents of PERM, n₂= respondents of ABMO, n₃= respondents of DRT, n₄= respondents of DSS, *= Percentage of columns, Figures in the parentheses show percentage of rows.

sample was of 31 respondents, combining four winter/summer Schools. Data were collected by using mailed questionnaire. It was mailed to 88 respondents, out of which 31 gave response from all four categories of respondents i.e. Participatory Extension Research and Management (PERM), Agri-Business and Marketing Opportunities and Challenges (ABMO), Drudgery Reduction Technologies for Farm Women and Farm Worker to Enhance Efficiency, Productivity and Occupational Safety in Agriculture(DRT) and Decision Support System in Agriculture Using Quantitative Techniques (DSS).

RESULTS AND DISCUSSION

To get a vivid portrait of the respondents according to aspiration level, they were categories into three groups' i.e. Low, Moderate and High level of skill development on the basis of arbitrary method.

A perusal of the Table 1 reveals that majority of respondents (93.55 per cent) were from high level of skill category, while 2 (6.45 per cent) could be placed under moderate level of skill category. The proportion of respondents reported in the low level of skill was nil per cent in the study area. The analyzed data Table divulge that 11 (100.00 per cent) PERM, 5 (100.00 per cent) ABMO, 8 (88.89 per cent) DRT and 5 (83.33 per cent) DSS participants respectively had high level of skill. Likewise, 1 (11.11 per cent) DRT, 1 (16.67 per cent) DSS, and equal percentage i.e. nil per cent PERM and ABMO participants were possessed moderate

level of skill. However, equal percentage i.e. nil per cent participants of PERM, ABMO, DRT and DSS were fell under the category of low level skill.

CONCLUSION

Majority of the respondents i.e. 93.55 per cent possessed high level of skill development, while 6.45 and nil per cent had moderate and low level of skill development respectively. The participants are required to be brought under high skill development level as this was found to be high. This could be done through persuasion during the training programme. The in depth study reveals that all the participants had highest level of future skill regarding ICAR sponsored training courses. Hence, the training should be continued.

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COST OF MECHANIZED FARMING, IT'S CONSTRAINTS AND SUGGESTIONS

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ABSTRACT

The study was conducted in Banaskanta district of Gujarat. A sample of 120 farmers was drawn for the study. Results indicated that cost of Mechanized farming was higher than non-mechanized farming. Major problem 'lack of finance' was faced by the farmers in order to adopt mechanized farming which may be mitigated by providing subsidy for purchasing costly implements & machines.

INTRODUCTION

The mechanization of Indian agriculture has assumed greater importance in increasing agricultural production and productivity by utilizing scarce agricultural inputs more effectively and reducing human drudgery. The green revolution characterized by the use of high yielding variety seeds, irrigation, chemical fertilizers and insecticides induced farmers to increase cropping intensity and adopt modern methods of agriculture. The introduction of high yielding varieties necessitated the support of mechanical power sources and improved agricultural implements and machines and hence selective mechanization become a necessity. The mechanized farming is costly and required high investment. This investigation related to the cost of mechanization in potato and groundnut farming is an attempt in this direction with the following objectives.

1. To study the cost of mechanized farming and non-mechanized farming in potato and groundnut crops.
2. To identify the constraints faced by the respondents in mechanized farming.
3. To seek suggestions to overcome constraints faced by the respondents in mechanized farming.

RESEARCH METHODOLOGY

The present study was carried out in the Banaskantha district of Gujarat state. Three talukas viz; Dantiwada, Deesa and Dhanera of Banaskantha district were selected for the study. From these three

talukas, five villages having highest production of potato and groundnut crops were selected purposively. From each village four tractor owners and four other than tractor owners were selected randomly. Thus, a sample of study was 120 farmers. Keeping in view, the interview schedule was prepared with through discussion with experts. The data were collected from the respondents by arranging personal interview. The cost of mechanized farming and non-mechanized farming was calculated considering fixed as well as operating cost for the potato and groundnut crops. The 't' test was used to compare the cost of mechanized farming and non-mechanized farming. The constraints in mechanized farming and suggestions to overcome constraints in mechanized farming were also studied. The appropriate statistical tools were used to analyze the data.

RESULTS AND DISCUSSION

Comparision of the cost of mechanized farming and non-mechanized farming

The cost of mechanized farming and non-mechanized farming was compared in land preparation, sowing, interculturing, harvesting and transport practices only because these practices involve high mechanization.

The data presented in Table 1 indicate that the cost of land preparation (ploughing, harrowing, cultivating, leveling and ridging) in mechanized farming was higher than non-mechanized farming in both potato and groundnut crops. In case of potato farming, the cost of mechanized farming with respect to land preparation practice was Rs.3950/- per hectare,

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Table 1. comparison of the cost of mechanized farming and non-mechanized farming with respect to different farming practices in potato and groundnut crops

No. Farming practices	Potato			Groundnut		
	Cost of mechanized farming (Rs./ha)	Cost of non-mechanized farming (Rs./ha)	't' test	Cost of mechanized farming (Rs./ha)	Cost of non-mechanized farming (Rs./ha)	't' test
1. Land preparation [^]	3950	2985	2.38*	5145	3450	2.18*
2. Sowing	945	400	2.10*	750	545	1.98*
3. Interculturing	-	-	-	-	670	-
4. Harvesting	970	620	1.99*	780	655	1.98*
5. Transport	225	155	2.10*	235	170	2.28*
Total	6090	4160	2.32*	6910	5490	2.11*

[^] Land Preparation includes ploughing, harrowing, cultivating, leveling and ridging.

*Significant at 0.05 level of significance

while the cost of non-mechanized farming with respect to land preparation practice was Rs.2985/- per hectare. The calculated 't' value was found to be 2.38 which was significant indicating that there was significant difference between cost of mechanized farming and non-mechanized farming in potato with regards to land preparation practice.

In case of groundnut crop, the cost of land preparation practice in mechanized farming was Rs.5145/- per hectare, while for non-mechanized farming, it was Rs.3450/- per hectare. The calculated 't' value was found to be 2.18 which was significant indicating that there was significant difference between cost of mechanized farming and non-mechanized farming with respect to land preparation practice in groundnut. Almost similar trend was observed in all the farming practices of both the crops.

Considering the land preparation, sowing, Interculturing, harvesting and transport practices in potato farming, total cost of mechanized farming was Rs.6090/- per hectare, while for non-mechanized farming was Rs.4160/- per hectare. The calculated 't' value was found to be 2.32 which was significant indicating that there was significant difference between cost of mechanized farming and non-mechanized farming.

In case of groundnut farming, total cost of land preparation, sowing, Interculturing, harvesting and transport practices was Rs.6910/- per hectare in mechanized farming whereas, that for non-mechanized farming was Rs.5490/- per hectare. The calculated value of 't' was found to be significant ('t'=2.11) indicating that there was significant difference between cost of mechanized farming and non-mechanized farming.

Constraint faced by the respondents in mechanized farming

The respondents were requested to express the constraints they faced in adopting mechanized farming, which are presented in Table 2. The constraints receiving frequency value of more than mean value (33.00) was considered as less important constraint. The data are presented in Table 2.

A perusal of the data presented in table revealed that the two most important constraints faced by the farmers were 'Lack of finance' (87.50 %) and 'High cost of mechanization' (76.66 %).

'Lack of Technical Knowledge', 'Lack of repairing facility in nearby area', 'Lack of skilled labourer', 'Lack of technical guidance when required' and 'Lack of availability of reliable spare parts' were found under the category of less important problems.

Table 2. Constraints faced by the respondents in mechanized farming

				(n=120)
S.No.	Constraints	Frequency	Per cent	Rank
1	Lack of finance	105	87.50	I
2	High cost of mechanization	92	76.66	II
3	Lack of Technical Knowledge	18	15.00	III
4	Lack of repairing facility in nearby area	8	6.66	IV
5	Lack of technical guidance when required	5	4.16	V
6	Lack of skilled labourer	2	1.66	VI
7	Lack of availability of reliable spare parts	1	0.83	VII

Suggestions from the farmers to overcome their constraints

The respondents were requested to express their suggestions to overcome the constraints in mechanized farming. The frequency for each suggestion was calculated in descending order. Mean frequency value was calculated to categorize the important and less important suggestions.

The suggestion receiving high frequency value that the mean frequency value was considered as an important suggestion and the suggestion receiving low frequency value was considered as less important suggestion. The data in this regards are presented in Table 3.

The suggestions offered by the respondents to overcome the constraints in mechanized farming, were

Table 3: suggestions stated by the farmers to overcome their constraints in mechanized farming

				(n=120)
S.No.	Problems	Frequency	Per cent	Rank
1	Subsidy should be provided to purchase costly implements/machines	68	58.66	I
2	Bank's rate of interest on loan should be low for farmers	59	49.16	II
3	Training should be provided to the farmers on mechanization aspects	11	9.16	III
4	Timely supply of electricity be provided to the farmers.	8	6.66	IV
5	Gramsevak should provide the technical guidance on mechanization aspects	4	3.33	V
6	Government should do critical checking on selling duplicate parts	3	2.5	VI
7	Road facility to each village be improved	1	0.83	VII

presented in descending order according to their important. They were "subsidy should be provided to purchase costly implements/machines"(58.66%), "bank's rate of interest on agricultural loan should be low for farmers"(49.16 %), "training should be provided to the farmers on mechanized aspect" (9.16 %), "timely supply of electricity be provide to the farmers" (6.66 %), "Gramsevak should provide the technical guidance on mechanization aspect"(3.33 %), "government should do critical checking on selling duplicate parts"(2.5 %) and road facility to each village be improved"(0.83 %).

CONCLUSION

The study revealed that total cost of mechanized farming for potato crop was Rs. 6090.00 per hectare, while for non-mechanized farming, was Rs. 4160.00 per hectare. The calculated 't' value (2.32) was significant. It indicated that there was significant difference between cost of mechanized farming and non-mechanized farming. In case of groundnut crop, total cost of mechanized farming was Rs. 6910.00 per hectare whereas, for non-mechanized farming was Rs. 5490.00 per hectare. The calculated 't' value was

significant ($t=2.11$) indicating that there was a significant difference between cost of mechanized farming and non-mechanized farming.

The constraints faced by respondents were: Lack of finance and high cost of mechanization. While, the major suggestions given by respondents were: Subsidy should be provided to purchase implements/machines and rate of interest on agricultural loan should be low.

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CONSTRUCTION OF KNOWLEDGE TEST FOR RKVY BENEFICIARIES ABOUT RECOMMENDED INTERVENTIONS OF WHEAT CROP

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ABSTRACT

Due to the non-availability of a proper scale for measuring the knowledge of beneficiary farmers of RKVY about recommended interventions of wheat crop in Udaipur district of Rajasthan. It was thought necessary to construct a test for the purpose and an attempt has been made to develop a test for measuring knowledge of beneficiary farmers of RKVY about recommended interventions of wheat crop. Pertinent items were collected covering all aspects of seed minikits, field demonstrations, farm mechanization, micro-nutrients application and plant protection equipments. After getting jury opinion on the items; item difficulty index, item discrimination index and reliability and validity were worked out. To administer the knowledge test a respondent is given one mark for each correct answer and zero mark for each wrong answer. Forty statements were finally selected from 72 statements.

INTRODUCTION

The National Development Council (NDC), in its meeting held on 29th May, 2007 resolved that a special Additional Central Assistance Scheme (RKVY) be launched. The NDC resolved that agricultural development strategies must be reoriented to meet the needs of farmers and called upon the Central and State governments to evolve a strategy to rejuvenate agriculture. The NDC reaffirmed its commitment to achieve 4 per cent annual growth in the agricultural sector during the 11th five year plan.

The scheme is essentially a State Plan Scheme that seeks to provide the States and Territories of India with the autonomy to draw up plans for increased public investment in agriculture by incorporating information on local requirements, geographical/climatic conditions, available natural resources/technology and cropping patterns in their districts so as to significantly increase the productivity of agriculture and its allied sectors and eventually maximize the returns of farmers in agriculture and its allied sectors.

RESEARCH METHODOLOGY

(a) Collection of items

The content of knowledge test is composed of questions called items. With the help of experts in

the field of agriculture and available literature, information pertaining to developing of knowledge test was gathered and different items on various aspects were prepared and enlisted. The items were then classified into five major sub-heads: seed minikits, field demonstration, farm mechanization, micro-nutrient application and plant protection equipment. Initially total 85 items were collected from various sources.

(b) Initial selection of items

The selection of items for knowledge test was done by keeping the following two criteria in view.

Item should promote thinking rather than simply rote (mechanical) memorization and item should differentiate the well-informed farmers of RKVY (i.e. wheat growers) from the poorly informed ones and should have a certain difficulty value.

It means that the items, which were not well understood by the farmers of RKVY (i.e. wheat growers) and the items, which all can correctly reply or none were not suitable for knowledge test.

Based on the above criteria, 72 items were initially selected encompassing major area of recommended wheat crop interventions under RKVY. The items selected were according to the level of knowledge and understanding of the farmers of RKVY (i.e. wheat

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grower). A schedule was prepared with these 72 items for administering them to the farmers for item analysis and screen out non-relevant and weak items. Correct replies for the items were ascertained in consultation with specialists and experts to prepare a key. The items were in alternative form. The procedure followed in selection of the test items were on the lines used by Sagar (1983).

(c) Administration of knowledge check to selected sample

The knowledge check thus prepared was administered to 30 farmers of RKVY (i.e. wheat growers). The responses were quantified by giving a score of one to the correct answer and zero to the incorrect answer or do not know reply. Thus, the total number of correct answers rendered by an individual was the knowledge score secured by him. Thus, the range of obtainable score was 0-107.

(d) Item analysis

The item analysis of a test usually yields two kinds of information *i.e.* item difficulty index and item discrimination. The index of item difficulty reveals how difficult an item is, whereas the index of discrimination indicates the extent to which an item discriminates the well-informed farmer of wheat crop from the poorly informed ones.

Having computed the scores obtained by 30 respondents, the scores were arranged from highest to lowest in magnitude. These 30 respondents were then divided into six equal groups, each having 5 respondents and were arranged in descending order of total scores obtained by them. These groups were named as G_1 , G_2 , G_3 , G_4 , G_5 and G_6 respectively. For item analysis, the middle two groups *i.e.* G_3 and G_4 were eliminated. Only four groups with high and low scores were considered for computation of item difficulty and item discrimination indexes. The range of scores (out of maximum 30) obtained by the respondents of the six groups were as follows:

$$\begin{array}{ll} G_1 = 81 \text{ to } 73 & G_4 = 56 \text{ to } 54 \\ G_2 = 66 \text{ to } 61 & G_5 = 53 \text{ to } 48 \\ G_3 = 59 \text{ to } 57 & G_6 = 47 \text{ to } 43 \end{array}$$

(i) Calculation of difficulty index

The next step was to determine the item difficulty

index. The index of item difficulty indicates the extent to which an item is difficult. An item should not be so easy that all the persons can pass it nor should be so difficult that none can pass it. The item difficulty as worked out in the present study was P_i *i.e.* the percentage of respondents answering an item correctly.

This was calculated by the formula:

$$P_i = \frac{n_i}{N_i} \times 100$$

Where,

P_i = Difficulty index in percentage of the i^{th} item.

n_i = Number of respondents giving correct answer to i^{th} item.

N_i = Total number of respondents to whom the i^{th} item was administered *i.e.* 30 in the present case.

(ii) Calculation of discrimination index:

Item discrimination index indicates the ability of the item to differentiate the well-informed respondents from the poorly informed ones. The $E^{1/3}$ formula was used in the present study for calculating the discrimination index. The formula used was as follows:

$$E^{1/3} = \frac{(S_1 + S_2) - (S_5 + S_6)}{N/3}$$

Where,

$E^{1/3}$ = Discrimination index of an item.

S_1, S_2, S_5, S_6 = the frequencies of correct answers in groups G_1, G_2, G_5 and G_6 , respectively

N = Total numbers of respondents in the sample of item analysis; here it was 30

However, an illustration of the method of calculating these indexes appears below in Table 2 wherein the difficulty and discrimination indices of items.

(e) Final selection of items for test

Two criteria *viz.*, item difficulty index and item discrimination index were considered for selection of items in the final format of the knowledge test. When a respondent passed an item, it was assumed, as Coombs (1950) described, that the item was less difficult than the individual's ability to cope up with it. For the purpose of the present study, the item with difficulty index ranging from 30 to 90 and discrimination index ranging from 0.10 to 0.80 were retained for final selection for inclusion in the knowledge check (Appendix).

(f) Reliability of the test

According to Anastasi (1968) "Reliability refers to the consistency of scores obtained by the same individuals when reexamined with the test on different occasions or with different sets of equivalent items or under other variable examining conditions."

To know the reliability of knowledge test the split half method was used. The format of the test consisting 40 items was split into two halves on the basis of odd and even number of items and was administered to 30 farmers of wheat crop in sampled area. Thus, two sets of scores were obtained and then scores were correlated with each other by-product moment correlation. The product moment correlation coefficient for two sets of scores was 0.70. Thus, it is that product moment correlation coefficient produces reliability coefficient of the test. This coefficient underestimates the reliability of the full length measure which provides a larger sample of the content domain and also tends to produce a wider range of scores, both of which have the effect of raising the reliability estimates. Hence, the above coefficient needs to be corrected to give the stepped-up reliability of the whole measure or to give the reliability of the full length test. The correction factor used for full length reliability coefficient according to Spearman – Brown prophecy formula is as under:

Spearman – Brown prophecy formula:

$$R_{tt} = \frac{2r_{1/2/11}}{1+r_{1/2/11}}$$

Where :

r_{tt} = The reliability coefficient of the whole test.

$r_{1/2/11}$ = The reliability coefficient of the half test.

The equation may also be written as follows:

Reliability of the whole test =

$$= \frac{2 \times \text{reliability of the half test}}{1 + \text{reliability of the half test}}$$

The value of r_{tt} came to be 0.82, testifying the internal consistency of the knowledge test.

(g) Test of validity

The contents of the knowledge scale were defined from review of literature, consultation with experts and practices for wheat crop by the Department of Agriculture of items included in the scale. Thus, it was assumed that the scores obtained by administering the knowledge scale measured what it was intended to measure. Therefore, reasonably enough, the scale was taken as valid measure of desired dimension. This validity is termed as content validity.

CONCLUSION

It can be concluded that total 40 questions were finally selected through item difficulty index and item discrimination index. It was assumed that developed test was reliable and valid for measuring the knowledge of farmers of RKVY about recommended interventions of wheat crop and hence, it was administered for its final use.

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Table 1. Calculations of difficulty and discrimination indices of knowledge items of wheat crop

No.	Item no. in the list	Frequencies of correct answers				Total freq. of correct answers $S_1+S_2+S_3+S_4+S_5+S_6$ $N = 30$	% of respondent giving correct answers (P_i)	$E^{1/3}$ Discrimination index
		S_1	S_2	S_5	S_6			
A Knowledge about Seed Minikits								
1	Name the varieties of wheat crop under seed minikits?	4	5	4	4	26*	86.66	0.10
2	What is the appropriate depth of sowing of seed minikit varieties of wheat?	5	3	5	5	28*	93.33	-0.20
3	What are the advantages of seed minikits of wheat?	5	5	4	4	26*	86.66	0.20
4	Name sources of seed minikits of wheat?	4	5	5	5	28*	93.33	-0.10
5	What is the appropriate sowing time of Raj-4037 variety of wheat?	4	5	2	2	20*	66.66	0.50
6	What is the seed rate of Raj-4037?	4	5	2	2	19*	63.33	0.50
7	What is the row to row spacing for Raj-4037?	4	5	2	2	19*	63.33	0.50
8	What is the average plant height of Raj-4037?	4	5	0	0	14*	46.66	0.90
9	What is the crop maturity period of Raj-4037?	3	5	1	0	14*	46.66	0.70
10	Name the characteristics of Raj-4037?	4	5	1	0	15*	50.00	0.80
11	What is the average yield of Raj-4037?	4	4	2	3	19*	63.33	0.30
12	What is the proper sowing time of Lok-1 variety of wheat?	5	5	3	5	25	83.33	0.20
13	What is the recommended row to row spacing of Lok-1?	5	5	4	3	23*	76.66	0.30
14	What is the recommended seed rate of Lok-1?	5	5	4	3	24*	80.00	0.30
15	What is the crop maturity period of Lok-1?	5	5	4	3	22*	73.33	0.30
16	What is the average plant height of Lok-1?	4	3	4	3	18*	60.00	0.00
17	Give the advantages of Lok-1?	5	3	4	3	22*	73.33	0.10
18	What is the average yield of Lok-1?	5	5	4	3	23*	76.66	0.30
B Knowledge about Field Demonstrations of wheat crop								
19	Have you heard about demonstration?	4	5	4	4	24*	80.00	0.10
20	If yes, what do you understand by wheat demonstration?	3	5	5	5	24*	80.00	-0.20
21	What are the advantages of wheat demonstration?	4	3	5	0	22*	73.33	0.20

22	Who conduct it?	5	5	2	4	24*	80.00	0.40
23	Which institution is responsible for conducting the demonstration?	4	2	0	3	16*	53.33	0.30
24	Name the wheat varieties demonstrated under RKVY?	2	1	1	3	16*	53.33	-0.10
25	Name the important practices which are essential for successful conducting the demonstration on wheat variety?	5	5	5	5	30*	100	0.00
26	What is the thio-urea?	3	3	3	3	13*	43.33	0.00
27	What is the thio-urea demonstration?	3	1	3	1	10*	33.33	0.00
28	How much quantity of thio-urea is required per hectare of wheat?	2	0	2	0	5*	16.66	0.00
29	At what stages of wheat crop should be used thio-urea?	1	0	1	0	4*	13.33	0.00
30	Why you apply the thio-urea in wheat crop?	1	1	0	0	3*	10.00	0.20
31	How much yield of wheat is increased after application of thio-urea?	1	0	0	0	2*	06.66	0.10
32	What is the content of thio-urea?	1	0	0	0	2*	06.66	0.10
C Knowledge about Farm Mechanization								
33	What do you mean by farm mechanization?	4	4	5	2	23*	76.66	0.10
34	Name at least three farm implements provided under NFSM?	5	3	4	5	23*	76.66	-0.10
35	What is the advantage of farm mechanization?	5	5	2	4	23*	76.66	0.40
36	For wheat crop seed-cum- fertilizer drill can be used?	4	3	4	5	24*	80.00	-0.20
37	If yes, what functions a SCFD performs during operation?	4	5	3	7	25*	83.33	0.10
38	How you will prepare the SCFD before operation?	4	4	5	5	27*	90.00	-0.20
39	What are the different adjustments of the SCFD?	5	1	4	3	17*	56.66	-0.10
40	Which parts of SCFD required cleaning after operation?	5	0	3	2	15*	50.00	0.00
41	Why cleaning is required of SCFD?	5	0	4	2	17*	56.66	-0.10
42	How much area with help of a SCFD can be sown of wheat in a day (8 hrs.)?	4	2	3	3	9*	30.00	0.00
43	For wheat crop rotavator can be used?	5	4	0	0	15*	50.00	0.90
44	If yes, what is the use of rotavator?	5	5	0	2	18*	60.00	0.80
45	How much area covered with the help of rotavator in a day (8 hrs.)?	5	5	0	0	17*	56.66	1.00
46	What are the main parts of the rotavator?	5	5	1	0	17*	56.66	0.90

47	What is the roter speed?	5	1	1	5	12*	40.00	0.00
48	What is the working depth of rotavator?	5	4	0	0	18*	60.00	0.90
49	For wheat crop multi-crop thresher can be used?	5	4	0	0	11*	36.66	0.90
50	If yes, what are the advantages of Multi-crop thresher?	5	3	0	0	12*	40.00	0.80
51	What is the capacity of Multi-crop thresher of wheat threshing?	5	2	0	0	8*	26.66	0.70
D Knowledge about Micro-Nutrient Application								
52	What do you mean by micronutrients?	5	2	0	0	19*	63.33	0.10
53	Why you apply it?	3	3	3	2	23*	76.66	0.00
54	Which type of micro-nutrients is required for wheat crop?	4	3	5	5	25*	83.33	-0.30
55	Which of the fertilizers apply in fulfilling the Zn deficiency?	5	4	4	2	20*	66.66	0.30
56	What is the rate of application of ZnSO ₄ ?	5	4	5	3	22*	73.33	0.10
57	Which of the fertilizer use in fulfilling the sulphur deficiency?	5	4	5	3	24*	80.00	0.10
58	What is the rate of gypsum application?	5	5	4	4	25*	83.33	0.20
E Knowledge about Plant Protection Equipments								
59	What do you mean by plant protection?	4	3	3	3	18*	60.00	0.10
60	Name the important plant protection equipments?	5	5	3	5	27*	90.00	0.20
61	What purpose the knapsack hand sprayer can be used in the wheat crop?	5	4	4	4	26*	86.66	0.10
62	What purpose the duster can be used in the wheat crop?	4	5	4	4	25*	83.33	0.10
63	How you will prepare the knapsack hand sprayer before operation?	5	4	3	4	21*	70.00	0.20
64	What is the main problem faced in operation of the knapsack hand sprayer?	3	3	4	3	14*	46.66	-0.10
65	In how much area you can apply pesticides with help of a knapsack hand sprayer in a day (8 hrs)?	4	4	4	4	21*	70.00	0.00
66	What is the common soil borne insect pest of wheat crop?	4	4	4	3	25*	83.33	0.10
67	What can be used to control the termite pest of wheat crop?	5	4	4	4	25*	83.33	0.10
68	Mention the recommended doses of Endosulfan and Methyl parathion used in wheat crop?	5	3	4	3	23*	76.66	0.10
69	What are the common diseases in wheat crop?	5	5	4	4	27*	90.00	0.20

70	Name the chemicals with doses used to control the diseases?	5	2	3	3	19*	63.33	0.10
71	Give the method for control of smut?	4	4	3	4	22*	73.33	0.10
72	How much quantity of vitavex is required for wheat crop?	5	4	4	3	23*	76.66	0.20

*The column indicates total frequency of correct answers, including those of G₃ and G₄, which were eliminated.

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STATISTICAL MODEL FOR AREA, PRODUCTION AND PRODUCTIVITY OF SELECTED CROPS IN UDAIPUR DISTRICT OF RAJASTHAN

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ABSTRACT

The present study was conducted in Udaipur district of Rajasthan. The important crops were selected on the basis of more than 75 percent cropped area under Udaipur district. Hence, the selected crops were maize, jowar, rice, wheat, barley, tur, small millets, urd and sugarcane. The results of the study reveals that compound growth rates of the total production of wheat, tur and urd has increased mainly due to increase in area and productivity. In case of maize, there is a decline in yield level but the output has increased due to increase in the area. Though there is a reduction in the area of jowar and small millets yet, the output has increased due to rise in productivity of these crops. In case of rice, barley and sugarcane the growth of output in these crops has declined due to significant decline in their respective area. However, there is an increase in the yield level.

INTRODUCTION

Rajasthan is the largest state of the Indian Union with a geographical area of 3.42 lacs sq. km. Rajasthan state accounts for 10.4 per cent of India's total geographical area but only 5.5 percent of the population. The present density of population is only 128, which is lowest in the country and allows highest per capita land, next to only the hilly states of Jammu & Kashmir. Obviously, the agriculture and allied sector are most important contributor in the state's economy. It contributes nearly 40 per cent of the state income and absorbs 69.3 per cent of the work force. The unfavorable natural conditions are the most limiting factors in shaping a dynamic agricultural system in the state. The state has less than 1 per cent of the country's water resources and scanty-erratic rainfall pattern. The 58 cm average rainfall in the state is the lowest in the country and ranges from a low of 10 cm in dry hot (arid) west to 100 cm in the humid southern parts. The state has the largest animal population of around 54.34 million (12.5 million cattle, 9.96 million buffaloes, 14.31 million sheep 16.93 million goats and 0.67 million camels).

Agriculture production is however subject to wide fluctuations depending on monsoon conditions. Despite of so many odds Rajasthan has attained the status of the leading producing state for a large number of agricultural commodities like bajra, moth, guar, mustard, wheat, maize, cotton and seed spices.

It contributes, 6.1 per cent of the country foodgrain production (8.6 per cent of wheat, 13 per cent of coarse cereals, 35.8 per cent of bajra and 7.4 per cent of maize). The state also contributed significantly by producing more than 14 per cent of the pulse produced in the country. Maize is an important Kharif cereal crop grown in Udaipur district.

The average productivity of kharif pulses increased from 0.50 q/ha (1986-87) to 3.21 q/ha during 1996-97. The productivity of soybean was 9.75 q/ha during 1996-97. The productivity of chickpea has increased from 5.83 q/ha (1986-87) to 7.05 q/ha during 1996-97. Among the seed spices, the productivity of coriander increased from 8.22 q/ha (1986-87) to 9.91 q/ha during 1996-97. The productivity of cumin decreased from 4.8 q/ha in 1986-87 to 0.65 million 3.3 q/ha in 1996-97. In a similar way, the productivity of cotton, guar and other important crops have increased significantly during the past one decade in the state. Specific objective of the present study is

- To identify most suitable statistical model for area, production and productivity of selected crops in Udaipur district.

RESEARCH METHODOLOGY

Selection of crops:

Rajasthan is the largest state of the Indian Union

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where large variation in the pattern of agricultural development is displayed from one district or region to another. Udaipur districts have been considered for the present study.

The following criteria have been employed for the selection of crops (Sharma, 1997). Firstly a crop is selected if it accounts for at least 5 per cent of the total cropped area (based on five years average i.e. 92-93 to 96-97) in the districts. At second stage crops accounts atleast 4 per cent of the total cropped area of a particular crop on the state was also selected for Udaipur district. Thus, all the important crops were selected and the total cropped area under the selected crops was more than 75 per cent in Udaipur district. Hence on the basis of this criterion selected crops for Udaipur district were Maize, Jowar, Rice, Wheat, Barley, Tur, Small Millets, Urd and Sugarcane.

To work out most appropriate model suitable for the selected crops for Udaipur district following models (linear and non-linear) were used.

Linear Equation:

A Linear trend equation is given as below

$$Y_t = a + bt$$

Where

$$Y_t = \text{Area/Production/Productivity in } t^{\text{th}} \text{ year}$$

t = Time variable which take the values 1,2,3, ... n

a = Intercept, b = Regression coefficient

Exponential Equation:

The compound growth rates of area, production and productivity of selected crops for in Udaipur district were worked out by employing the following formula

$$Y_t = ab^t \quad (1)$$

$$\text{or } \log Y_t = \log a + t \log b \quad (2)$$

$$\text{or } \log Y_t = A + Bt \quad (3)$$

Where, A = log a and B = log b

Compound growth Rate (CGR) = (Antilog b-1) x 100

Second Degree Curve Fitting to logarithms:

The following equation was used for fitting second degree curve (in logarithms)

$$Y_t = a b^t c^{t^2} \quad (1)$$

$$\log Y_t = \log a + t \log b + t^2 \log c \quad (2)$$

$$\log Y_t = A + Bt + Ct^2 \quad (3)$$

Where, A = log a, B = log b and C = log c

The values for a, b and c were calculated with the help of least squares techniques.

Where, b = Slope of curve,

c = Rate of Change in slope

Further, for each trend equation estimated values of coefficient i.e. regression coefficient (b), CGR (r) and rate of change in the slope (c) were tested for their significance by student t-test. The coefficient of determination (R^2) was also estimated and its significance was tested with the help of F-test for each equation.

RESULTS AND DISCUSSION

The observation on area, production and productivity of different selected crops for the years 1970-71 to 1996-97 were subjected to trend analysis to find out most appropriate model in the districts of Udaipur. The results have been presented in table 1 for different models suitable for area, production and productivity of the selected crops in Udaipur district. Perusal of table1 clearly indicates that none of the equation explained the variation in all the three components i.e. area, production and productivity in case of jowar, rice and urad crops. However, among the kharif crop in case of maize quadratic and log quadratic equation each explained 33% variation in case of area whereas none of the equation could explain significant variation in production and productivity. Table further indicates that there is an increasing trend as indicated by significant linear coefficients. But the rate of increase is decreasing as evident from negative coefficients of quadratic term of these two equations i.e. quadratic and log quadratic. It is recommended to use quadratic equation for the sake of relative clarity and ease as compared to log quadratic equation.

In case of sugarcane 39% (linear equation) to 51% (log quadratic equation) variation could be explained by the four equations in case of area whereas in case of production this ranged from 27% (log linear

Table 1. Regression Co-efficient, Compound Growth Rates and Coefficient of Determination of Area, Production and Productivity of Selected Crops in Udaipur District for Various Models

Crops	Model	Period 1970-71 to 1996-97								
		Area			Production			Productivity		
		t	t ²	R ²	t	t ²	R ²	t	t ²	R ²
Jowar	1	-0.1556 (0.1588)	-	0.0370	0.1185 (0.1359)	-	0.0295	8.2869 (5.0920)	-	0.0958
	2	-0.9813 (0.866)	-	0.0492	1.4972 (1.635)	-	0.0274	2.6160 (1.418)	-	0.1133
	3	-0.0709 (0.6723)	-\$ (0.0233)	0.0376	0.7790 (0.5586)	-0.0236 (0.0194)	0.0860	33.016 (20.9298)	-0.8832 (0.7255)	0.1484
	4	\$ (0.015)	-\$ (£)	0.0612	0.0504 (0.031)	-\$ (£)	0.1057	0.0438 (0.026)	-\$ (£)	0.1722
Maize	1	0.1972 (0.5086)	-	\$	0.4062 (1.8413)	-	\$	0.1013 (8.6537)	-	0.0000
	2	0.0485 (0.276)	-	\$	0.0294 (1.152)	-	£	-0.0168 (1.151)	-	0.0000
	3	6.0475** (1.7679)	-0.2089** (0.0613)	0.3304**	4.0425 (7.7608)	-0.1299 (0.2690)	0.0115	-14.9313 (36.5148)	0.5369 (1.2657)	0.0101
	4	0.0136** (£)	-\$** (£)	0.3336**	\$ (0.021)	-\$ (£)	\$	-\$ (0.0202)	£ (£)	0.0104
Rice	1	-0.1399 (0.0789)	-	0.1118	-0.1190 (0.1646)	-	0.0205	-1.5085 (8.7772)	-	\$
	2	-1.1101 (0.660)	-	0.0999	-0.8833 (2.237)	-	0.0161	0.4459 (1.896)	-	\$
	3	0.2561 (0.3234)	-0.0141 (0.0112)	0.1671	0.5899 (0.6809)	-0.0253 (0.0236)	0.0653	25.6121 (36.7343)	-0.9686 (1.2733)	0.0247
	4	\$ (0.0122)	-\$ (£)	0.1193	\$ (0.042)	-\$ (£)	0.0109	0.0142 (0.0346)	-\$ (£)	\$
Small Millets	1	-0.4010** (0.0337)	-	0.8496**	-0.1572** (0.0408)	-	0.3731**	2.3748 (5.1829)	-	\$
	2	-8.4776** (0.632)	-	0.8692**	1.9763 (1.315)	-	£	1.5083 (0.250)	-	0.0145
	3	-0.6108** (0.1359)	\$ (£)	0.8639**	-0.5030** (0.1565)	0.0123* (£)	0.4844**	-30.3931 (20.8413)	1.1703 (0.7224)	0.1061
	4	-0.012 (0.011)	-\$* (£)	0.8946**	-0.2881 (0.2312)	0.0106 (£)	0.0687	-0.0482 (0.044)	\$ (£)	0.0775
Wheat	1	0.2103 (0.4833)	-	\$	3.8248** (1.0050)	-	0.3668**	48.6502** (6.9984)	-	0.6591**
	2	0.3025 (0.692)	-	\$	3.0040** (0.948)	-	0.3109**	2.7093** (0.473)	-	0.6809**

Barley	3	2.0810 (2.0088)	-0.0668 (0.0696)	0.0442	1.3895 (4.2255)	0.0870 (0.1465)	0.3760** (25.3481)	-24.3982 (0.8786)	2.6089**	0.7507**
	4	0.0128 (0.014)	-£ (£)	0.0375	0.0129 (0.016)	-£ (£)	0.3109*	-£ (£)	£**	0.7293**
	1	-1.4636** (0.2179)	-	0.6435**	-1.5768** (0.3518)	-	0.4455**	27.8400** (6.8061)	-	0.4009**
	2	-4.8440** (0.657)	-	0.6515**	-3.1598** (0.758)	-	0.4085**	1.7536** (0.468)	-	0.3906**
Tur	3	-1.1006 (0.9195)	-0.0130 (0.0319)	0.6460**	-2.4929 (1.4776)	0.0327 (0.0512)	0.4548**	-42.1846 (24.7798)	2.5009** (0.8589)	0.5573**
	4	-£ (0.013)	-£ (£)	0.6885**	-0.0101 (0.0142)	-£ (£)	0.4104**	-\$ (£)	-£*	0.5177**
	1	0.551* (0.0198)	-	0.2363*	0.0686** (0.0184)	-	0.3568**	6.8339 (5.3866)	-	0.0605
	2	2.8880 (0.948)	-	0.2240*	92.1040** (21.542)	-	0.5751**	1.0182 (2.328)	-	0.0176
Urad	3	-0.1894** (0.0664)	\$** (£)	0.5228**	-0.0775 (0.0717)	-\$* (£)	0.4566**	-43.9817* (20.1560)	1.8148* (0.6986)	0.2667*
	4	-0.0376* (0.0164)	\$** (£)	0.4490**	0.3545 (0.2059)	-\$ (£)	0.5773**	-0.0671 (0.0397)	\$ (£)	0.1321
	1	0.1465 (0.0750)	-	0.1537	0.0361 (0.0852)	-	\$	-0.3557 (5.0142)	-	£
	2	0.8117 (0.441)	-	0.1382	1.6432 (2.387)	-	0.0222	0.8831 (2.230)	-	\$
Sugarcane	3	0.1358 (0.3213)	£ (0.0130)	0.1537	-0.0131 (0.3646)	\$ (0.0148)	0.019	-5.6585 (21.4327)	0.2209 (0.8671)	\$
	4	\$ (£)	£ (£)	0.1383	-0.0172 (0.0435)	\$ (£)	0.0381	-0.0200 (0.0408)	\$ (£)	0.0251
	1	-0.1968** (0.0494)	-	0.3882**	-8.007** (2.5393)	-	0.2846**	262.8797 (213.0754)	-	0.0574
	2	-4.2009** (0.993)	-	0.4089**	-3.9110** (1.261)	-	0.2714**	0.8906 (0.627)	-	0.0740
	3	0.2083 (0.1911)	-0.0145* (£)	0.4896**	6.8553 (10.2903)	-0.5308 (0.3567)	0.3450**	452.6206 (901.5668)	-6.7765 (31.2499)	0.0592
	4	0.0178 (0.0174)	-\$* (£)	0.5051**	0.0108 (0.0233)	-\$ (£)	0.3155**	0.0107 (0.0113)	-£ (£)	0.0891

Figures in brackets are standard errors

1. Linear Equation, 2.Exponential Equation, 3. Quadratic Equation, 4. Second Degree Curve Fitting to logarithms

*Significant at 5 per cent level of significance, **Significant at 1 per cent level of significance

\$ Indicates three significant digits after decimal, £ Indicates four or five significant digits after decimal

The units of area and production are thousand hectares and thousand tonnes.

equation) to 35% (quadratic equation). But the coefficients of linear as well as quadratic component in respect of both quadratic and log quadratic equation are not significant so it is recommended that linear equation explaining 28% variation be used which shows that every years production of sugarcane is decreasing by 3910 tonnes.

Small millets are grown during the Kharif season. In this case variations in area, were explained by these equation in the range 85% (linear equation) to 89% (log quadratic equation). Here also there is not wide range in the explained variation by different equations so it is better to use linear equation for the sake of ease to understanding. This equation indicates that every year there is reduction about 400 hectares of area under small millets crop. About production quadratic equation capable of explaining 48% variations is recommended. The values of coefficient indicate that there is a decrease in the production and rate of decrease is also of increasing side. No equation could significantly explain the variation in the productivity.

Another important rabi crop grown in Udaipur district is wheat. All the four equations significantly explained the variations in the production and productivity of wheat but none of these explained variations in the area. From the table 1 it can be seen that linear equation in case of production and quadratic equation in case of productivity can be select for the crop of wheat. From the linear equation obtained for production 37% variation is explained. The equation suggest that every year production is increasing by 3825 tonnes quadratic equation though explaining little more variations (38%) as none of the coefficient significant. As productivity is concern it is recommended to use quadratic equation which explained 75% variation, the significant coefficient of quadratic components indicative of increasing trend in the rate of productivity.

All the equations significantly explained variation in the area, production and productivity of barley crop. From perusal of Table 1 on the basis of significance of coefficients of different equations, linear equation is found suitable for area and production whereas quadratic equation can be taken for productivity. In case of area, linear equation explained 64% variation showing a reduction of 1464

hectares of area every year. Whereas in case of production 45% variation explained by this from linear equation which shows a decrease of 1578 tonnes per year. Quadratic equation significantly explained variation in productivity by 56% indicating an increasing trend in the reduction of productivity.

An analysis of observation in respect of tur suggests that all the four equations significantly explained variation in area and production, whereas only quadratic equation could explain variation in productivity. From the perusal of table 1 it can be deduced that quadratic equation suitable for area and productivity whereas log linear equation is better for production. These equations explain 52%, 58% and 27% variation in area, production and productivity respectively.

CONCLUSION

The results of the trend analysis of the selected crops in Udaipur district none of the equation is found suitable for area, production and productivity of rice crop. Further for Udaipur district quadratic equation (area) are recommended for maize crop. But in case of Udaipur district linear equation (area) and quadratic equation (production) are found suitable for small millets. For tur crop in Udaipur district quadratic equation (area and yield) and log linear equation (production) is found suitable. In case of Udaipur district linear equation (production) and quadratic equation (yield) is recommended for wheat crop. For barley crop in Udaipur district linear (area and production) and quadratic equation (yield) is found suitable. Linear equation for production of sugarcane is found suitable for Udaipur district.

Thus linear equation ($Y_t = a+bt$) has a wider applicability in the districts of Udaipur. This equation has been found suitable in majority of cases for estimating and predicting the area/production/productivity of crops in Udaipur district of Rajasthan. Moreover, this has specific advantage of ease of understanding and relatively better prediction capacity.

The analysis of compound growth rates reveals that in Udaipur district the total production of wheat, tur and urd has increased mainly due to increase in area and productivity. In case of maize, there is a decline in yield level but the output has increased

due to increase in the area. Though there is a reduction in the area of jowar and small millets yet, the output has increased due to rise in productivity of these crops. In case of rice, barley and sugarcane the growth of output in these crops has declined due to significant decline in their respective area. However, there is an increase in the yield level.

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