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THE INDIAN SOCIETY OF EXTENSION EDUCATION
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EDITORIAL

Responding to the Criticisms of Extension

The Extension as a discipline and practice is under criticism for right and wrong reasons. The scientists and professionals of extension education cannot ignore them. It is interesting to note that several years ago William M. Rivera has identified the following three major developments confront Extension internationally: "the first is disturbing, the second unsettling, and the third encouraging. These developments are: (1) attacks on Extension as an institution, (2) controversy about models of Extension, and (3) learning lessons about effective Extension. Each of these will affect Extension's future worldwide." In our country the public sector Extension has been criticized for its inefficiency, poor impacts and effectiveness, irrelevance and inability to reach the small and marginal farmers. Often we hear the statement that "the public extension machinery in India is collapsed". One of the main reasons for poor performance of public Extension is its inbuilt inefficiency due to bureaucratic nature of extension system. Another major problem is non-availability of proper technologies for transfer. There is an urgent need to review what is required and bring desirable changes in public extension system including the necessity of research system to develop appropriate technologies especially for resource poor conditions. Further, we have to improve the professional status and service conditions of extension professionals. When the post of VLW was created during 1950's, it was envisaged that a person who will join as VLW could go up to the position of a District Collector. However, we all know the promotional avenues available to the extension personnel. What can we expect from a VLW who will join as VLW and retires as VLW, after 35 to 40 years of service?

We the extension scientists have greater role in dealing with "System Model Controversy". As we, all know that no single model of extension will be effective to meet the needs of different complex situations. In the past, we have made the grave mistake of recommending a single system for all situations or following an imported foreign model. The success of extension discipline in the coming years will be measured by our commitment to do research and come out with suitable extension models to meet the demands of different situations on our country. With regard to the issue of impacts of extension, several past studies have indicated that investment made in extension gave greater and profitable returns. However, the studies related to impacts of extension in recent years are very less and results of these studies have not been communicated to the policy makers. It is time that we undertake several new research studies related to costs and financing of public Extension.

I am glad to place before you the present volume of the journal which has several research papers and notes which are notable for their scholarship and usefulness. You will find that several papers in this volume deals with issues like adoption of shrimp culture, impacts of IVLP programme, job performance of VLWs, Zero tillage, WTO and effectiveness of extension services. I hope that you will find time read these papers and enrich your knowledge and practices. I acknowledge with great appreciation the diligent efforts of Dr. (Mrs.) Rashmi Singh, Dr. (Mrs.) Premata Singh and Dr. R.N. Padaria of the Division of Agricultural Extension, IARI, New Delhi in editing the papers and bringing out the present issue.


K. Vijayaragavan
Chief Editor

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Factors Influencing the Extent of Adoption of Shrimp Culture Technologies

P. S. Swathi Lakshmi, K. Chandra Kandan, and N. Balasubramani*

ABSTRACT

Fisheries sector occupying a unique status in India as it provides employment, food and nutritional security and foreign exchange. Shrimp farming is an integral activity of the fisheries sector. Shrimp culture on commercial scale begun very recently in India. Among the various factors which determines the adoption of shrimp farming governmental policies and market in wake of post WTO era is most important. Some of the environmental issues are also associated with the shrimp farming. So, the present study is an attempt to study the policies responsible for adoption of shrimp culture in the Nellore district of Andhra Pradesh. The study showed that the legal and environmental policies influenced the adoption of shrimp culture technologies.

State formed the sample for the study. The sampling method followed was the multistage random sampling.

For measurement of the perception of the shrimp farmers towards the policy issues affecting shrimp farming, a group of policy issues which secured the first 11 ranks were selected based on judges ranking, and the shrimp farmers were asked to express their degree of favourableness towards the policy statements on five points continuum ranging from highly favourable to least favourable for which score ranging of 5-1 were given. The adoption behaviour of shrimp farmers was studied by selecting 12 practices/recommendations, starting from pond preparation to harvest based on judges ranking and measured by using the adoption quotient developed by Balasubramaniam (1988). Cost was operationalised as the expenditure incurred for each of the shrimp culture technologies adopted by the individual respondent. Cost was measured based on a scoring procedure developed for the study. Thus for every 50,000 Rupees a score of one was assigned.

The data were collected using structured interview schedule and analysed by using factor analysis. In this study, factor analysis was used to group the variables into factors based on the commonalities observed, and to find out the relative importance of each factor in accounting for the particular set of variables being analysed. The method of factor analysis used for the study was principal component analysis and the rotation method used was varimax rotation.

Shrimp culture in India has begun on a commercial scale only during the last decade. About 1.2 million hectares of land has been identified as suitable for brackish water aquaculture, of which only about 0.10 million hectares are under cultivation (Rajagopal, 2002). Liberalisation of economy, high profitability and good international markets are the factors, which have given impetus to shrimp culture boom in India. The investment required for rising a single crop of Shrimp per hectare is quite high often running to the tune of few lakhs of rupees. Nevertheless it is a highly profit oriented business and attract a number of farmers and entrepreneurs to this field. Hence cost is a crucial factor influencing the extent of adoption of shrimp culture technologies. Commercial shrimp culture has also earned the wrath of environmentalists and ecologists for the so-called "ecological destruction. In this context, the government has formulated some policies to regulate and streamline the growth of this expanding industry on scientific lines ensuring little damage to environment. With these considerations in mind, a study was undertaken with the following objectives:

- I. To study the policies responsible for adoption of Shrimp culture technologies as perceived by Shrimp farmers.
- II. To determine the costs responsible for adoption of Shrimp culture technologies as perceived by Shrimp farmers.

METHODOLOGY

Sixty shrimp farmers drawn randomly from six villages belonging to three blocks of Nellore district of Andhra Pradesh

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RESULTS AND DISCUSSION

Factor loadings of perception of policies with respect to extent of adoption of shrimp culture technologies.

An observation of Table-1 revealed the factor loadings, commonalities, eigen values and the percentage of variance explained by the factors. Out of the eleven policies, four factors have been extracted and these four factors together explained the total variance of these policies to the extent of 72.36 per cent.

Table 1: Factor loading of perception of policies with respect to extent of adoption of shrimp culture technologies (N=60)

Policies	Factors	1	2	3	4	Commonalities
1. Guidelines of the AAI with respect to effluent treatment system	0.787	-0.240	0.119	0.129	0.708	
2. Decision of the supreme court to allow only improved extensive method of shrimp culture	0.824	-0.117	0.106	0.132	0.739	
3. Registration of shrimp farms with AAI	0.527	0.660	0.031	0.134	0.753	
4. Role of MPEDA in providing farm subsidies	0.809	0.298	0.193	-0.188	0.817	
5. Non existence of quality control measure	0.297	0.614	-0.354	0.382	0.727	
6. Supreme courts order against conversion of agricultural and salt pans to Shrimp farms	0.713	0.391	-0.041	-0.190	0.699	
7. Impact of supreme court verdict on shrimp exports from India	-0.465	-0.452	-0.450	0.404	0.787	
8. Quality control norms of European Union and U.S.	-0.055	0.251	-0.436	-0.714	0.765	
9. Antidumping duty of U.S. Govt.	-0.375	0.302	0.582	0.305	0.765	
10. Govt. efforts to strengthen infrastructure facilities in processing plants.	-0.405	0.523	0.599	-0.324	0.663	
11. Delay in passing AA Bill in parliament.	0.256	-0.651	-0.113	0.099	0.512	
Eigen values	3.416	2.200	1.194	1.150	7.960	
% of variation explained	31.059	20.002	10.854	10.452	72.367	
Cumulative % variation explained	31.059	51.061	61.915	72.366		

The factors were rotated for meaningful interpretation and the results are presented in the vari max rotation matrix in Table 2.

Table 2: Rotated factor (Vari max) matrix of eleven policies

Policies	Factors	1	2	3	4
1	0.642	-0.463	-0.186	-0.216	
2	0.694	-0.444	-0.138	-0.201	
3	0.700	0.204	0.448	-0.022	
4	0.894	0.013	-0.057	0.079	
5	0.365	-0.058	0.777	-0.046	
6	0.791	-0.010	0.135	0.233	
7	-0.405	0.149	0.775	0.017	
8	0.012	0.140	0.021	0.863	
9	-0.135	0.600	0.048	-0.531	
10	-0.039	0.887	-0.108	0.047	
11	-0.030	-0.634	-0.306	-0.120	
Higher values	3.136	2.044	1.588	1.192	
% variation explained	28.509	18.582	14.437	10.838	
Cumulative % variation explained	28.509	47.091	61.529	72.366	

An analysis of Table 2 showed the interpretation of the rotated factors in the vari max matrix. A total of four factors were identified as having maximum percentage variance. Each factor column was scanned for identifying a few policies with significantly high loadings. Thus from each factor column, the policies having a factor of more than 0.5 were selected factor loading from each factor was grouped and presented in Table 3.

Table 3: Policies with factor loadings under different factors

FACTOR	POLICIES	FACTOR LOADINGS
FACTOR I	1	0.642
	2	0.649
	3	0.700
	4	0.894
FACTOR II	6	0.791
	9	0.600
	10	0.887
FACTOR III	11	0.634
	5	0.777
FACTOR IV	7	0.775
	8	0.863

The first factor accounted for 31.60 per cent of the total variance, and it could be noted that were five policies which had significant loading on factor I. They were the policy number 4 i.e. role of MPEDA (Marine products Export Development Authority) in providing subsidies and technical assistance for Shrimp farms (0.894), policy number 6 i.e. Order of the Supreme Court of India against conversion of agricultural and salt pans to Shrimp farms (0.791), policy number 3 i.e.

registration of Shrimp farms with the agriculture Authority of India (AAI) (0.700), Policy number 2 i.e. Decision of the Supreme Court to allow only improved extensive method of Shrimp culture, and Policy number 1 i.e. guidelines of the AAI with respect to effluent treatment system (0.642). Since most of the policies deal with legal issue the factor is termed "Legal" factor.

Table 4: Factor loadings of perception of cost with respect to extent of adoption of shrimp culture technologies.

Cost of Technologies	Factor 1	Commonalities
Cost of pond bottom conditioning	0.993	0.986
Cost of pond bottom sterilization	0.995	0.991
Cost of measurement of soil pH	0.380	0.144
Cost of lime application	0.995	0.991
Cost of predator eradication	0.996	0.991
Cost of manures and fertilizers	0.993	0.987
Cost of acclimatization and stocking of fry	0.931	0.866
Cost of water management	0.950	0.902
Cost of soil management	0.996	0.991
Cost of feed management	0.995	0.991
Cost of health management	0.931	0.866
Cost of Harvesting	0.995	0.991
Eigen Values	10.697	10.697
% of variation explained	89.143	89.143
Cumulative % variation explained	89.143	89.143

Factor II

The second factor accounted for 20.00 per cent of the total variance in the policies. Under factor II there were three policies which had significant factor loadings. They were policy number nine i.e. Antidumping duty to be lived by the U.S. Government on Indian shrimp exports (0.600), Policy number 10 i.e. government efforts to strengthen infrastructural facilities in processing plants (0.887). Since the policy of the government to strengthen infrastructure facilities in processing plants has obtained the highest factor loading of 0.887, this factor is termed as "Processing" factor.

Factor III

Policy number 5 namely the non existence of a body monitor quality control measures (0.777) and policy number 7,

i.e. the impact of Supreme Court verdict on Shrimp exports from India (0.775) accounted for 10.85 per cent of the total variance, and since these two policies are directly related to Shrimp exports the factor was labelled as "Export" factor.

Factor IV

Policy number 8, i.e. Quality control norms imposed by shrimp importing nations like the United States (U.S) and the European Union (E.U.) accounted for 10.45 per cent of the total variance. Since the policy is directly related to the importing norms it was termed as "Import" factor.

Factor loadings of perception of cost with respect to extent of adoption of shrimp culture technologies.

An observation of Table 4 revealed the factor loadings, commonalities, eigen values and the percentage of variance explained by the factors. Out of the costs of the 12 technologies considered, one factor has been extracted and this single factor explained the total variance of the cost of technologies to the extent of 89.14 percent. Since only one factor has been extracted, formation of var. max matrix does not arise. Besides this single factor extracted was labelled as "Cost of culture, Nellore" factor.

CONCLUSION

Environmental issues have always been the focus of debate in shrimp farm development in the recent past. As could be inferred from the study, the policies pertaining to the legal issues such as supreme courts order against conversion of agricultural land to shrimp farms, registration of shrimp farms with the Aquaculture Authority of India, decision of the Supreme Court to allow only improved extensive method of shrimp culture are found to have higher factor loadings. Hence these factors have to be taken care of while planning and implementing scientific shrimp culture programmes among the target farmers.

The factor explaining the cost of all the 12 technologies were observed to be interrelated and together explained 89.14 per cent of the variation in the extent of adoption of shrimp culture technologies. Shrimp farming being a capital intensive venture, efforts should be undertaken by the research system for the production of cost effective technologies, so that more number of Shrimp farmers are motivated to undertake shrimp farming which contributes to 71 per cent of the total sea food exports.

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Impact Analysis of Institute-Village Linkage Programme

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ABSTRACT

An analysis of impact of IVLP Programme undertaken by Bidhan Chandra Krishi Viswavidyalaya revealed that it failed to secure the participation of the stakeholders. The project also failed not only to identify the problems of the farmers but also in choice of technologies for intervention. The only positive aspect of the project was that it avoided pro-rich bias.

An analysis of agricultural scenario in India indicates that in food front the productivity has reached its plateau from well-endowed resources. But the demographic pressure is still increasing and to neutralise pressure it requires special attention to the complex, diverse and risk-prone agriculture emphasising system approach, conceiving technology not only from the point of view of productivity but also stability, sustainability and equability (Das and Singh, 1995).

This calls for a shift from conventional top-down approach of technology transfer to the establishment of linkage between development agencies and farmers (Jha, 1998) through a participatory bottom-up approach. Under this situation Institute-Village Linkage Programme (IVLP) had been initiated on pilot basis under selected ICAR institutes and state agricultural universities (SAUs) during 1995, with the main objective to increase the productivity of CDR agriculture through technology transfer after assessment and refinement.

The ILVP was also undertaken by Bidhan Chandra Krishi Viswavidyalaya (B.C.K.V.) since 1995, and completed its stipulated eight years of operation. Therefore, it has become necessary to evaluate whether the programme has achieved its pre set objectives or not. As IVLP was operated in a participatory mode, it is mandatory that its evaluation should be participatory. With this view the present study was initiated with following objectives:

- To assess the justification of different treatments associated with different interventions in the context of different recommendation domains;
- To identify the number of problems and their priorities over different well-being groups;
- To identify strength, weakness, opportunity and threats of different interventions;

- To assess the equitability in the distribution of the assistance given by the project authority over the targeted population.

METHODOLOGY

The IVLP under B.C.K.V. was implemented in three villages, namely Madandanga, Kantabeli and Teligacha in Chakdah block of Nadia district in New Alluvial Zone of West Bengal. Though, Teligacha is remote one, it was selected for the study to avoid spatial/road-side bias (Chambers, 1995). Village Basantapur, has been selected purposively as control in the study design as it is adjacent to project site and comparable to selected village Teligacha under the project in respect of farming situation excepting the project intervention. Focus groups in case of experimental village was identified with the help of the activists of IVLP for issue focused learning on the basis of the Project Plan Document. But in case of control village, the groups of the respondents were selected purposively for focus groups discussion. In this study, two types of research designs made. After only design involving one experimental and one control village and before-after design involving one experimental village had been followed. For data generation some evaluating tools under PRA/PLA had been used. The tools are furnished in the Table-1 with purpose of use in the study.

Table 1: PLA tools used in the study along with purposes

Tools	Purposes
Micro farmings situation and well being ranking (Basu and Sengupta, 2004)	To assess the justification of mapping different treatments associated with different interventions in the context of different recommendation domains
Problem ranking and well being ranking	To identify the number of problem and their priorities over different well-being groups

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SWOT analysis (FAO, 1990) To identify strength, weakness, opportunity and threats of different interventions

Well being ranking and secondary data review (Basu et al. 1997) To assess the equitability in the distribution of the assistance given by the project authority over the targeted population

Analysis of data was very subjective and in-depth using charts in the most of the cases. But in few cases very simple statistical tools like frequency distribution have been used.

RESULTS AND DISCUSSION

The appropriateness and effectiveness of IVLP with respect to Technology Assessment and Refinement (TAR) are the focal of this section. For the presentation the result and impacts of IVLP, findings related to each objective of the present study are dealt separately.

Objective 1: To Assess the justification of different treatments associated with different intervention in the context of different recommendation domains.

Variability is the characteristics of the nature. In a village all the land fragments are not homogeneous. They differ on soil type, fertility status, slope, water holding capacity, drainage, irrigation and so on. So each relatively smaller homogeneous field forms a particular micro-farming situation. The farmers consider those variability for making farming decisions. Again farmers differ in their well being positions and their farming systems are also in congruence with these.

So variability in farming practices is generally minimised within farmers belonging to the same well being group operating in same micro farming situation. In a nutshell this combination (well-being position x micro-farming situation) is operationally defined as recommendation domain (i.e., homogeneity in respect of well being group and micro ecological niche. Suitability of a particular treatment has a close relationship with this recommendation domain. The treatments under each intervention should be analyzed in the light of recommendation domains.

Following project document of IVLP eight interventions (pointed gourd, jute, cauliflower, rice, brinjal, milchcow goat, and poultry) were identified. For crop intervention micro farming situations vary from 4 to 8 and well being categories are 3 (well-off, medium, poor). For livestock intervention well-being categories are 4 (well-off, medium, poor and very poor), and instead of micro-farming situation Analysis of Difference (Guijt, 1994) has been followed e.g. in case of goat two categories have been identified - milk and meat purpose goat and servicing purpose goat. The recommendation domains for each intervention and the set treatment prescribed for them are presented in Table-2

Table 2: Recommendation domains for different interventions

Interventions	Recommendation domains	Number of set of Treatments
Pointed gourd	18 (6 x 3)	3
Jute	18 (6 x 3)	2
Early cauliflower	18 (6 x 3)	1
Late cauliflower	24 (8 x 3)	3
Summer rice	12 (4 x 3)	2
Brinjal	18 (6 x 3)	1
Milch cow	4 (1 x 4)	1
Goat	8 (2 x 4)	1
Poultry	8 (2 x 4)	2

From the above discussion it is clear that the treatments have been prescribed without any emphasis on recommendation domains. Blanket application of treatment is mostly found. Overall condition of a particular intervention with respect to its micro-farming situation or other factors causing differences and also then number of well-being categories associated with that intervention has not been taken into consideration.

Objective 2: To identify the number of problems and their priorities over different well-being groups

In this evaluation study the problems of the villagers related to agriculture and livestock enterprises have been identified separately from each well-being group, as the problems and their prioritisation are not similar in all groups. The common problems of agriculture and live stock enterprises of control have also been identified to make a comparison. The problems and their prioritisation are presented in Table-3(a), 3(b), and 3(c).

Table 3 (a): Problem Ranking of the Experimental Village at the Time of Inception of the Project

Problems	Ranks
Poor productivity in jute	1
Poor productivity and stability in pointed gourd due to higher degree of disease-pest infestation	2
Low milk and meat productivity in goat	3
Low productivity in cow milk	4
Low productivity in fowl and duck	5
Poor productivity in cauliflower	6
Declining yield in summer rice	7
Decreasing marketable yield of brinjal	8

Table 3 (b): Problem ranking of experimental village at the time of evaluation

Very Poor and poor groups		Medium Group		Well-off Group	
Problems	Ranks	Problems	Ranks	Problems	Ranks
Under utilization of human resources (Aggl. Labourers) in rainy season	1	Poor productivity in most of the cropping systems as a result of reducing fertility status of soil	1	Poor productivity in most of the cropping systems as a result of reducing fertility status of soil	1
Poor productivity in poultry	2	Poor productivity in jute	2	Poor productivity in cauliflower	2
Poor productivity in Goat	3	Poor Profitability in cauliflower	3	Poor productivity in pointed gourd	3
Poor productivity in Milkcow	4	Poor profitability in pointed gourd	4	Poor productivity in brinjal	4
				Poor productivity in jute	5
				Poor productivity in banana	6
				Poor productivity in potato	7
				Poor productivity in pointed gourd	8

Table 3(c): Problem ranking of control village at the time of evaluation

Problems	Ranks
Poor productivity in cropping system due to reducing fertility status	1
Poor productivity in brinjal due to disease-pest infestation	2
Poor productivity in cauliflower due to disease infestation	3
Poor productivity in jute due to disease-pest infestation	4
Poor productivity in chili due to disease infestation	5
Poor productivity in tomato due to disease infestation	6
Poor productivity in cucumber due to disease infestation	7

It is clear from the above Tables that at the time of inception of the project only overall problems associated with agriculture and allied were considered, without considering the problems of specific groups. Over the period of project operation many new crops have been introduced and new problems have emerged. But there is lack of constant monitoring of new problems. In case of agricultural enterprises the most important problem faced by both experimental and control villages is poor productivity in cropping system due to reducing soil fertility status. Experimental villages, though having project intervention, can not avoid it. Similarly poor productivity in

pointed gourd remains a major problem in spite of receiving project intervention regarding this aspect in the experimental village, but in control village the farmers have not highlighted it. Therefore it requires a proper probing and assessment by the project authority to know the reasons for this difference.

Object 3: To identify strength, weakness, opportunity and threats of different interventions.

At the time of inception villagers had identified their main problems and their points of interventions. The project authority had prescribed treatment for those interventions. The villagers have identified strength, weakness, opportunity and threats of those treatments or project activities at the time of evaluation. Here only the most highlighted activities with their SWOT analysis are presented in Table-4.

Table 4: Strength, weakness, opportunity and threat analysis of the project

Project activities	Strength	Weakness	Opportunity	Threat
Planted pond plant in the poor's own field	Good value and use of the fruits	In the early season when the market price of pointed gourd was very high, the plants over the field produce less amount of fruits	Application of microplastic to control the insects may be helpful	The field affected with insects may be lost, down there is a crop
Application of pesticides to control insects in pointed pond	Good value and use of the fruits	In the early season when the market price of pointed gourd was very high, the plants over the field produce less amount of fruits	Application of microplastic to control the insects may be helpful	The field affected with insects may be lost, down there is a crop
Application of phosphorus compound to increase the productivity of the cauliflower	Good value and use of the fruits	In the early season when the market price of pointed gourd was very high, the plants over the field produce less amount of fruits	Application of microplastic to control the insects may be helpful	The field affected with insects may be lost, down there is a crop
Application of the salt of the tomato to increase the productivity of the tomato	Good value and use of the fruits	In the early season when the market price of pointed gourd was very high, the plants over the field produce less amount of fruits	Application of microplastic to control the insects may be helpful	The field affected with insects may be lost, down there is a crop

It reduces the soil erosion	It reduces the soil erosion	It reduces the soil erosion	It reduces the soil erosion
It reduces the soil erosion	It reduces the soil erosion	It reduces the soil erosion	It reduces the soil erosion
It reduces the soil erosion	It reduces the soil erosion	It reduces the soil erosion	It reduces the soil erosion

From the above discussion it is evident that in the prescribed treatments for different interventions the cost effectiveness, profitability, eco-friendliness, methodological complexities of the treatments and above all the priorities of a particular enterprise to its users have not been considered.

Objective 4: To assess the equitability in the distribution of the assistance given by the project authority over targeted population

In the selected village the project authority had distributed the required materials to the villagers for the prescribed sets of treatments for different interventions. Some input of income augmentation had also been distributed among them. The study revealed that Rs. 16630/- (Rs. 755.9/- per family) and Rs. 15341/- (Rs. 547.89/- per family) have been spent for very poor and poor groups respectively, where as Rs. 16485/- (Rs. 549.5/- per family) and 19326/- (Rs. 357.88/- per family) have been spent for medium and well off groups respectively. It is evident that project authority has spent more money for very poor and poor groups. From this angle pro-rich bias has not been found so much. But diversity of interventions is more in well-off and

medium groups than other as more enterprises are present in these two groups.

CONCLUSION

The IVLP is a project having a new dimension of participation. But it has failed to secure proper participation of the stakeholders. Project has also failed to identify well-being group specific problems that hampered the identification of proper point of intervention for the problems and choice of proper treatment. The cost effectiveness, profitability, Eco-friendliness, methodological complexities of the treatments and above all the priorities of a particular enterprise to its users have not been considered by the project authority a blanket application of those treatments over a number of recommendation domains has been found. But the only positive aspect of this project worth of highlighting is that it has avoided pro-rich bias maintaining equitability in the distribution of assistance over the targeted population.

Therefore, to overcome these drawbacks of the project proper planning and securing proper participation of the people are the most important prerequisites. Identification of existing groups and their problems are also very important. Selection, implementation, adjustment or modification of the technologies should be in congruence with the problems of different groups. Participatory monitoring should be an integral part of the project cycle, so that the activities of the project will be re-oriented as required.

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Farmers' Satisfaction of Agricultural Extension Services in an Irrigation Command Area

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ABSTRACT

Agricultural extension services have been frequently criticised for failing to produce results. An attempt was made in this study with the objective of understanding the perception of farming community about extension services and the extent of their satisfaction. The study was conducted in Lower Bhavani Project Command area of Erode district of Tamil Nadu. Findings of the study revealed that majority (61%) of the farmers had a low level of satisfaction. The study also revealed a number of constraints such as poor soil condition, scarcity of water, faulty method of irrigation, topography of land and lack of knowledge in adoption of modern water management practices.

Effective extension service depends not only on how well the extension service functioned but also on the complex social, economic, technical, organisational and physical environment in which it operates (Hauzen, 1980). Agricultural extension services have been frequently criticised for failing to produce results. Measuring the quality of agricultural extension programmes is a professional responsibility for the service so that relevant information for future planning could be obtained. Many studies have been conducted to measure the effectiveness of extension services using criteria like effective dissemination of information (Axtabaka and Barnistie, 1991), appropriateness of method and relevance of extension programmes to the clients' need (Kantner, 1982), frequency of visits and time spent (Padaria, 1995), solving field problems with efficiency (Davel, 1990), quality of field staff (Benor and Harrison, 1983), and Bembridge and Steyn, 1984 etc.) However the views of the farmers have been neglected in most of the studies. Hence an attempt was made in this study with the objective of understanding the perception of farming community about the extension services and what extent they are satisfied about the same.

METHODOLOGY

The study was conducted in Lower Bhavani Project Command area of Erode District in Tamil Nadu. The total length of the command is 124 km and it has been divided into three reaches (Upper-up to 41 km; Middle-42 to 83 km & Lower-beyond 83 km) based on the distance from the dam. Forty farmers from each reach were selected for this study. The responses were collected from 120 farmers using a well-structured and pre-tested interview schedule.

Farmers' satisfaction of extension services was measured based on eight dimensions, which were identified after meticulous review of literature, consultation with extension experts, extension workers and progressive farmers. They included provision of appropriate technical information especially on water management, frequency and mode of communication, timeliness of services, supply of inputs, solving field problems and advisory services, fairness of extension personnel and overall impact of extension services. An index* was developed for this purpose following the summated rating procedure developed by Edwards (1957). The reliability and validity of the Index were measured through test-retest and content validation methods respectively.

The satisfaction index consisted of 24 statements to which the respondents gave their responses on a five-point continuum. The responses were added to get a respondent's satisfaction score. The satisfaction index was calculated as below.

$$\text{The individuals obtained score} \times 100 \\ \text{Client Satisfaction Index} = \frac{\text{Maximum score possible i.e. 120}}{\text{Maximum score possible i.e. 120}}$$

Statistical tools such as Standard deviation (SD), percentage analysis and 't' tests were used wherever required. The correlation co-efficient was used to study the relationship between the farmer's socio-personal characteristics and their client satisfaction index.

RESULTS AND DISCUSSION

Most of the respondents in this command area were literate and coming under old age group. Majority of them (60%) were

small and marginal farmers. Majority of them had 20-25 years of farming experience and belonged to low income group. They had medium level of social participation and irrigation sources. They preferred to avail credit from institutional sources like Primary Agricultural Credit Societies (PACS) & Nationalised Banks. The extent of farmers' satisfaction over the agricultural extension services in LBP Command area as measured by Client Satisfaction Index (CSI) was categorised and the overall picture is presented in the Table 1. It is observed from the Table-1 that majority of the farmers (60.83%) expressed lower level of satisfaction over extension services. Nearly one-third of farmers (31.67%) expressed medium level of satisfaction and very few farmers (7.50%) expressed higher level satisfaction over extension services.

Majority of middle and lower reach farmers (65.00% and 67.50% respectively) and half of the upper reach farmers (50.00%) expressed lower level of satisfaction. More than one-third (35.00%) of upper reach farmers and more than one-fourth of middle (27.50%) and lower reach (30.00%) farmers had medium level of satisfaction. Non-significant 't' values indicate that there were no significant variations in the level of satisfaction over extension services expressed by the farmers of all three reaches. Majority of the farmers revealed that they were not informed by extension workers about water management practices. The farmers had also not approached extension personnel for any information. This was because majority expressed they knew the cultivation practices of paddy and other crops from the childhood and there was no need to meet extension personnel. Moreover, the extension workers rarely met them for giving any inputs or other materials.

Many farmers expressed that mass media like radio and television were helpful as sources of farm information. The study also revealed that the farmers were not satisfied with the quality of agricultural inputs supplied through agricultural depots. Many expressed that agricultural depots and primary agricultural societies often sold the inputs forcefully. While getting loan from Primary Agricultural Credit Society (PACS), farmers had to take poor quality fertilizers for one-third of the loan amount. These problems forced the farmers to buy fertilizers, chemicals and seeds from local input dealers.

Input dealers themselves were farmers, having regular contact with officials of private fertilizers and pesticides companies. It was surprising that many local input dealers belonged to extension workers family or who had earlier worked in some private fertilizers and/or pesticides company. They were well informed of cultivation practices of major crops of that area. The private sales representatives also provided them with posters, leaflets, folders and other visual materials. Since these input dealers were all local people and relatives of fellow farmers they enjoyed high credibility among the farmers.

The study revealed that majority of respondents had not gone for any training regarding water management practices and no training programme on this topic was organised by

extension workers. But many have attended training programme like IPM in cotton, rat control, storage of food grains, drip irrigation of coconut etc., organised by extension department in collaboration with Tamil Nadu Agricultural University. Many respondents regretted that agricultural scientists failed to give new technologies, new implements that would minimize labour cost and increase their yields.

Many small and marginal farmers regretted that the extension workers were biased towards big farmers while giving subsidized inputs and other materials like plough, sprayers, tarpaulin etc. Many farmers expressed the opinion that the extension workers were corrupt and did all types of malpractices.

Relationship between socio-personal characteristics and extent of satisfaction of extension services.

The relationship between socio-personal characteristics of the farmers and their level of satisfaction over extension services was studied and findings are given in Table-2. It is seen from Table-2 that socio-personal variables viz., education, farm size, irrigation status and social participation had positive and significant relationship with farmers' satisfaction of extension services at one per cent level.

Those farmers having dependable sources of irrigation and supplementary irrigation through wells and tanks always have.

Table 1: Extent of farmers' satisfaction over the agricultural extension service

Agricultural extension service				
Satisfaction level	Frequency	% of Farmers		
		Total N=120	Upper reach (U) N=40	Middle reach (M) N=40
Low	73	20	26	27
	(60.83)	(50.00)	(65.00)	(67.50)
Medium	38	14	11	1
	(31.67)	(35.00)	(27.50)	(2.50)
High	9	6	2	1
	(7.50)	(15.00)	(5.00)	(2.50)

F value: Between U and M = 0.533863 NS; U and L: 0.192204 NS; M and L: 0.493006 NS; NS = Non-Significant

Table 2: Relationship between socio-personal characteristics and farmers' satisfaction

Socio-personal variable	r' value
Age	-0.1482 NS
Education	0.3285**
Farm size	0.2740*
Occupation	0.0690 NS
Irrigation status	0.3712**
Farming experience	-0.0714 NS
Annual income	0.2096*
Social participation	0.3509**
Credit behaviour	0.2176*

NS = Non-significant, ** = Significant at 1% level, * = Significant at 5% level

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Constraints experienced by farmers in adopting water management practices

The constraints experienced by the farmers in adopting recommended practices of water management are presented below:

Summer ploughing

Table 3: Constraints in practising summer ploughing

Constraints	Frequency* of farmers (N=120)	%
High cost of ploughing	86	71.67
Shortage of labour	63	52.50
Lack of soil-moisture	59	49.17
Non-availability of land	51	42.50

* Multiple responses

It may be observed from the Table 3 that nearly three fourth of the farmers (71.67%) opined that high cost was a major constraint to do summer ploughing. This was due to high charges for hiring tractors. Half of the respondents (52.50%) expressed shortage of labour as a constraint. Nearly half of the respondents (49.17%) mostly from lower reach expressed lack of moisture as a major constraint to do summer ploughing. Non-availability of land was a major constraint expressed by 42.50 per cent of farmers.

Recommended Varieties

Table 4: Constraints in adopting recommended varieties

Constraints	Frequency of farmers* N=120	Percentage
Long duration of crop varieties	56	46.67
Marketing problem	54	45.00
Lack of conviction of superiority of recommended seeds	49	40.83
Shortage of labour	33	27.50
Non-suitability for fodder	31	25.83
Poor germination of seeds	21	17.50
Low yield	21	17.50

* Multiple responses

It is observed from Table 4 that nearly half of the farmers (46.67%) opined that the recommended varieties were of long duration hence it might lead to water shortage at later stage of crop growth. As reported by 45.00 per cent farmers that the recommended varieties like ADT 38 and 39 were not good for cooking, hence the merchants were reluctant to purchase them. More than one-third of the respondents (40.83 percent) reported that they were adopting their own seeds for the sake of 'fortune'

(27.50 %) reported that shortage of labour was the major constraint. One fourth of the respondents (25.83 per cent) reported that the recommended varieties of fodder were not good for their cattle. The other constraints reported were poor germination and low yield.

Nursery Practices

It is seen from the Table 5 that half of the respondents (50.83%) believed that what they were following was sufficient. One-third of the farmers (32.50 %) reported that dense planting of seedlings helped in uprooting. This reduced labour, time and cost. Some of the farmers (17.50 %) mostly from lower reach stated that uncertainty of water availability forced them to follow less or more nursery area.

Table 5: Constraints in adopting nursery practices

Constraints	Frequency of farmers* N=120	Percentage
A. Nursery area		
Belief as present practice sufficient	61	50.83
Belief on superiority of dense seedlings	39	32.50
Uncertainty of water availability	21	17.50
B. DAP application		
Perception as FYM and green manure	24	20.00
superior to DAP.	24	20.00
C. Integrated Plant protection		
Lack of Knowledge	22	18.33

* Multiple Responses

One-fifth (20.00 %) of farmers reported that since they had applied FYM and green manure to nursery there was no need to apply DAP. Same percentage of farmers stated high cost as a major constraint. About 18 Per cent of the farmers reported that lack of knowledge was the major constraint to follow plant protection practices for nursery.

Method of Planting, Plant Population and Spacing

Table 6: Constraints in following method of planting, plant, population and spacing

Constraints	Frequency of farmers* N=120	Percentage
Untrained contract Labour	91	75.83
Lack of knowledge	43	35.83
Fear of yield loss	18	15.00

Most of the respondents did not follow recommended method of planting, plant population and spacing. It may be noted from the Table 6 that three-fourth of respondents (75.83 %) reported labour shortage as the major constraint. Since planting was done by all the farmers in the locality at same time there was acute shortage of labour.

Constraints in adopting irrigation practices

Table 7: Constraints in adopting irrigation practices

Constraints	Frequency Of farmers* N = 120	Percentage
Poor soil condition	81	67.50
Scarcity of water	39	32.50
Distant location	36	30.00
Availability of water	33	27.50
Faulty method of Irrigation	31	25.83
Topography of land	26	21.67
Seepage of water	26	21.67
Lack of knowledge on Water management Practices	22	18.33

* Multiple Responses

A perusal of the Table 7 depicts the following constraints experienced by the farmers in adopting recommended irrigation practices.

Poor soil condition: Majority of the respondents (67.50 %) reported that their soil condition would not permit them to follow irrigation once in 4-5 days. The predominant soil type of the study area was red sandy gravel type. It would not hold water for more than 48 hours.

Scarcity of water: One-third of farmers (32.50 %) most of them from lower reach and tail ends of middle and upper reaches reported that delayed reach of water, uncertainty of frequency because of pilferage by other farmers and their soil conditions forced them to irrigate more.

Distant location: Nearly one-third of farmers (30.00 %) revealed that their fields were located away from the sluices and at tail ends. So they could get irrigation only after all the upper and middle reach farmers. Uncertainty and soil conditions were also cited as reasons against recommended method.

Availability of water: About one-fourth of the farmers (27.50 %), majority of whom were from upper and middle reach stated that they had abundant supply of water and hence they were applying water daily or on alternate days depending upon the total area coming under that particular sluice.

Faulty method of irrigation: One-fourth of the respondents (25.83 %), most of whom were upper reach farmers followed field to field irrigation just like flooding. In those areas to avoid conflict between farmers all of them together appointed one common irrigator 'Thannikatti' per outlet. These were the persons irrigating all the fields and most of the works like application of fertilizers and spraying of chemicals were done by them. They were paid by kind or/and cash per season. They used flooding and field to field irrigation leading to enormous wastage of water and other related problems like water logging and salinity. Because of flood irrigation fertilizers applied in one field would move into subsequent field resulting in yield loss. But respondents revealed that there was no other way to avoid conflict and make up for that shortage of labour.

Topography of Land: One fifth of farmers (21.67%) reported that since their lands were not properly levelled water would not stand uniformly. Many revealed that the sloppiness of their lands made water move from one field to other field leading to water logging at lower levels.

Seepage of Water: One fifth of the respondents (21.67 %) located nearby canals, distributories, sluices reported that seepage of water from the above mentioned sources made their fields always full of water.

Lack of Knowledge: Nearly one fifth of the respondents (18.33%) stated lack of knowledge also as a constraint. There were no demonstration plots to show them how to follow water management practices.

It could be observed from the above related reasons that there was an urgent need for extension department to lay demonstration plots, conduct training programmes and educate the farmers regarding water management and water related problems like water logging and salinity.

CONCLUSION

The results of extension effectiveness explicitly proved that the extension strategies followed in the LBP Command area need reorientation. Since majorities of the farmer in the area are progressive they expect more scientific and technical inputs from the extension system. Irrigation water management requires adequate and added attention owing to deficit water availability in the command. Correct information at an appropriate time, repeated and simultaneous message through mass media, conducting specialised training programmes on irrigation water management, training farm women targeting of messages to different sections and reaches, demonstration plots, personal contacts with all section of farmers and educating the farmers about water related problems are to be taken care of by the extension system. This may improve the farmers' knowledge and their level of satisfaction with extension services, which in turn contribute for adoption. The successful water users' associations can be effectively utilised

as a medium for technology transfer for better water management at farm level.

Adequate training for farmers and extension workers on water management practices have to be provided. The

constraints faced by the farmers in adopting water management practices have to be solved with the help of extension and research systems.

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A Statistical Modelling Approach for Multiple Analysis of Job Performance

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ABSTRACT

As horticulture sector is highly technology driven coupled with hi-tech interventions like micro-irrigation, micro propagation, protected cultivation, etc., it is necessary to have skilled manpower at different levels. The last link of this chain is the village extension services, which reach rural communities through Village-level Extension Workers (VLEWs). To understand how the VLEWs affect the performance of extension activities at village level and to improve their job performance, methods have to be worked out to analyse their tasks related to their job performance. The training of extension workers requires the closer attention and must be related to the services that they will have to perform. The objectives of this investigation were to study the job performance of extension personnel and to find out the relationship between relative importance of job and their competencies in carrying out these jobs as perceived by village level extension personnel by developing suitable statistical models. The paper discusses a statistical modelling approach for multiple analysis of job performance with reference to relative importance and competency of village level extension workers.

A Technology Mission for Integrated Development of Horticulture in the North-Eastern region has been launched by the Central Government. The objective of the mission is to improve production and productivity of horticultural crops and bring about positive changes in production of horticulture food crops in these states. This mission apart from emphasizing on research and improvement of production also lays stress on post-harvest management, processing, marketing and exports. The Department of Agriculture of these states, where separate Department of Horticulture does not exist is entrusted to implement various programmes under this mission. New and improved knowledge are required to enable the traditionally non-horticultural farmers of these states to successfully and safely practice horticulture, and to support and needs of the change in the dynamic horticultural farming systems. The basic goals of village extension services are agricultural and rural problem solving for the area collection of basic farming data to feed back to research institutes; and dissemination of technology to the area. Extension agents provide mainly advice, although they sometimes provide inputs for activities such as demonstrations. One VLEW guides nearly 800 farm families. Agricultural experts of the department train the VLEWs every month. VLEWs work in close co-ordination with other

developmental agencies like Patter Parishalana Samities (PPS) which are formed at the initiative of the department for promoting agricultural activities. These include training to farmers, distribution of HYV seeds, chemical fertilizers, pesticides & fungicides, machineries and implements etc., at subsidized rate or sometimes free of cost where demonstrations are conducted. Moreover, licenses have been issued to private parties for dealing the business from where farmers can purchase HYV seeds, chemical fertilizers, pesticides, machinery and implements etc. as and when required under the guidance of Agricultural Extension Officers and Sub-Divisional Agricultural Officers. Eventually, these farm advisors would be in charge of all extension activities within the block. Thus the study was aimed at exploring the job performance component of extension personnel.

METHODOLOGY

Database analysis

The study was undertaken among the Village Level Extension Workers (VLEWs) of the Department of Agriculture, Government of Assam. Twenty-five VLEWs working in twelve divisions viz., Bongaigaon, Cachar, Darranga, Dhubir,

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Golaghat, Kamrup, Kokrajhar, Morigaon, Nagaon, Nalbari, Nalaim and Sonitpur formed the sample for this study. During 15 days training programme at Indian Institute of Horticulture, Bangalore thirty-five jobs related items related to horticultural activities of these VLEWs were identified based on their job chart. These job charts have been used for studying the job performance of extension personnel (Ashaletha et al. and Prabhakar et al. 1998). These jobs were then categorized into seven specific areas viz., Planning, programme delivery, Training and education, Input supply and infrastructure development, Advisory services, Field level monitoring and Evaluation. The frequency of performance of these jobs, relative importance of these jobs and their competency in these jobs were assessed with the help of a questionnaire developed for this purpose (Vijayaraghavan and Hansra, 2001). Each dimension was having three items, each of which were measured on scoring scale ranging from 1 to 5 such as rarely to daily, very low to very high and very little to very high respectively. The database consists of information obtained from 25 respondents on frequency of job, relative importance of the job and job competency as perceived by them for seven areas.

Statistical modelling

As a first step, linear correlation coefficient among frequency of job performance Y (dependent variable) with relative importance of the job (X1) and competency in the job (X2) (independent variables) as perceived by 25 respondents were worked out individually for all the seven areas. Then a statistical model relating frequency of job with relative importance of the job and competency in the job was developed individually for all the seven areas following the procedure of least square technique (Ryan, 1997).

Measures of model adequacy

As a measure of goodness-of-fit of the developed models, the values of the Co-efficient of determination (R^2) (Agostid'no and Stephens, 1986) and Mean Squared Error (MSE) was calculated as below:

$$a) \text{ Co-efficient of determination } (R^2): \\ R^2 = 1 - [(Y_i - \bar{Y})^2 / (Y_i - Y)^2]$$

$$b) \text{ Mean Squared Error (MSE):} \\ MSE = [(Y_i - Y)^2 / n]$$

Where Y_i represents the frequency of job as perceived by the that respondent and the number of respondents.

However, inclusion of an additional independent variable into the selected candidate model will always boost the computed R^2 value (Kvalsteh, 1985). Hence, to ensure the statistical significance of the computed regression coefficients, they were subjected to t-test statistical analysis (Draper and Smith, 1981).

To get further insight into the results obtained, a step-wise regression procedure (Ryan, 1997) was employed, as delineated below, to select the most crucial factor, which can influence the variability in frequency of job as perceived by 25 respondents.

In step-wise regression, the final regression equation is developed stage by stage. The first independent variable (X1) that enters the regression equation is the one that has the highest simple correlation with the dependent variable (Y). The regression coefficient of Y on X1 is computed and tested for its significance. If it is found to be significant, then based on the highest first order partial correlation coefficient, the next variable to enter is selected. Then the regression equation is fitted with these two variables. Making use of the F-test, the two partial regression coefficients are tested to determine if they should be retained in the equation. The non-significant coefficient is deleted. This process of selection of new variables to enter is thus continued until all the variables are exhausted and are found significant, resulting in the final equation comprising only the significant independent variables.

RESULTS AND DISCUSSION

Linear correlation coefficient among frequency of job performance Y (dependent variable) with relative importance of the job (X1) and competency in the job (X2) (independent variables) as perceived by 25 respondents worked out individually (Table 1) indicated for the presence of highly significant positive correlation among frequency of job with relative importance of the job and competency in the job for all the seven areas.

Table 1: Linear correlation coefficient among frequency of job performance (Y), relative importance of the job (X1) and competency in the job (X2) for seven job areas

Job Area	R (Y:X1)	R (Y:X2)
Planning	0.94**	0.93**
Programme delivery	0.936**	0.934**
Training and education	0.786**	0.71**
Input supply and infrastructure development	0.958**	0.91**
Advisory Services	0.958**	0.91**
Field Level Monitoring	0.954**	0.91**
Evaluation	0.951**	0.921**

**Significant at 1% level.

The maximum correlation coefficient value between frequency of job performance and relative importance of job was observed in case of input supply and infrastructure development (0.958) and similarly, where as correlation coefficient between frequency of job performance and job competency was found to be highest for advisory services (0.935).

A STATISTICAL MODELLING APPROACH FOR ANALYSIS OF JOB PERFORMANCE

As a next step, statistical models were developed individually for all the seven areas and the results are presented in Table 2.

Table 2: Result of statistical models along with goodness of fit statistics for frequency of job performance with relative important of the job (X1) and competency in the job (X2)

Job Area	Model (With Standard error (SE))	R ²	MSE	F-Test	t-Stat for B _i
Planning	$Y = 0.101 + 0.706X_1 + 0.333X_2$ (0.28)	0.894	3.4	93.07**	2.353** (0.191NS)
Programme delivery	$Y = 0.046 + 0.531X_1 + 0.443X_2$ (0.372)	0.884	2.8	84.15**	1.45NS (1.18NS)
Training and education	$Y = 0.86 + 1.21X_1 - 0.177X_2$ (0.144)	0.662	7.01	18.10**	2.73** (-0.45NS)
Input supply and infrastructure development	$Y = 0.84 + 1.314X_1 + 0.393X_2$ (0.262)	0.925	2.59	135.76**	5.12** (0.079NS)
Advisory services	$Y = 0.964 + 0.907X_1 + 0.025X_2$ (0.31)	0.910	2.38	111.42**	2.95** (0.079NS)
Field Level monitoring	$Y = 0.38 + 1.38X_1 - 0.46X_2$ (0.30)	0.915	1.85	117.7**	4.63** (-1.61NS)
Evaluation	$Y = 1.33 + 1.19X_1 - 0.33X_2$ (0.305)	0.91	2.22	111.7**	2.9** (-1.1NS)

** Significant at 1% level.

Perusal of Table 2 here indicates that about 66.2 per cent (In the case of training and education) to as high as 92.5 per cent (Input supply and infrastructure development) of the variation in frequency of job performance has been collectively explained by both relative importance of the job performance and job competency as perceived by 25 respondents. Though the developed models resulted in high R^2 values and lesser mean square error values, as described earlier, the statistical significance of the regression coefficients corresponding X1 and X2 were worked out, tested and presented in the last column of the Table-2. It may be noted that for all the seven areas except program delivery, the regression coefficient corresponding to the factor relative importance of job was statistically significant as the t-test values exceed 1.96, the 5% normal table value. Further, none of the regression coefficients across all the seven areas corresponding to job competency are significantly related to frequency of job performance as indicated by the t-test statistical value (being less than 2.0). Accordingly, step-wise regression models were developed individually for all the seven areas and the results are presented in Table-3.

Table 3: Results under step-wise model for frequency of job performance with relative importance of the job (X1)

Job Area	Optimised model	R ²	MSE	F	t-Stat for B _i
1.	$Y = 0.8520 + 1.051X_1 + 5.05b$ (0.942)	0.887	3.51	181.48**	13.47**
2.	$Y = 0.036 + 0.955X_1$ (0.075)	0.887	2.85	164.01**	12.81**
3.	$Y = 0.772 + 1.037X_1$ (0.168)	0.819	6.76	37.29**	6.11**
4.	$Y = 0.844 + 0.938X_1$ (0.659)	0.917	2.74	255.29**	15.978**
5.	$Y = 0.967 + 0.931X_1$ (0.061)	0.910	2.28	232.92**	15.261**
6.	$Y = 0.543 + 0.915X_1$ (0.062)	0.907	1.99	217.6**	14.75**
7.	$Y = 1.304 + 0.863X_1$ (0.058)	0.906	2.241	220.8**	14.9*

Perusal of Table-3 indicates that about 61.9 per cent (in the case of training and education) to as high as 91.7 per cent (input supply and infrastructure) of the variation in frequency of job performance has been explained solely by relative importance of the job as perceived by 25 respondents. Further, the regression coefficient was also statistically significant as indicated by the t-statistical value, which in absolute value exceeded 2.0, the critical region value, for all the seven areas. This further strengthens the statistical validity of the models. To conclude, for all the areas, results of step-wise models developed indicated that variation in the frequency of job performance (indicated by respective R^2 values) as perceived by 25 respondents was solely due to the relative importance associated with the job (X1). Respondents attached more significance to relative importance of the job as a major factor for frequency of job and were to the extent of 91.7 per cent in case of input supply and infrastructure development.

CONCLUSION

The analysis on relationship of job performance with relative importance and technical competence of extension staff unveiled the need of redefining their jobs with focus on knowledge-based technologies to upgrade and improve their skills. To improve quality of job performance includes better input support, rationalised training, and exposure to relevant technology and communication techniques. Findings are expected to help administrators as well as training institution design appropriate techniques to improve these conditions in extension organisations as well as equip extension workers with the relevant technical competence. In addition, these upgraded farm advisors would be expected to formulate and target location specific recommendation, including systems-based technologies, to reflect the needs of different socio-economic groups of farmers within their block or service area.

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Zero-Tillage Technologies: An Overview

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ABSTRACT

The Zero-tillage technology is economic, time saving, efficient in fertilizers use and is acceptable to the farmers during Rabi 2001-2002 and 2002-2003 in the district Maharajganj of Uttar Pradesh. The findings have clearly established that wheat sowing can be advanced at least 10-12 days over conventional tillage (broadcasting method), enabling to harvest an advantage that cannot be obtained by using varieties recommended for late sown condition. The critical examination of field observation revealed that the technology has merit for promotion and technical feasibility. The results have also shown an increase in productivity of the wheat ranging from 0.8 to 3.00 quintal/hectare. In addition to that saving in fuel consumption to the tune of 26.25 to 43.75 litres/hectare, economizing cost of seed and its seeding up to 33 per cent and 10 to 40 per cent less irrigation water requirement over conventional practices. Thus, the overall net profitability gain of worth Rs.2350.00 per hectare in 2001-02 and Rs. 4150.00 per hectare in 2002-03, appears good attraction for the farmers to adopt the technology on a large scale.

The rice-wheat cropping system occupies 12 million hectares (m.ha) of land in the Indo-Gangetic plains comprising of the state of Punjab, Haryana, Uttar Pradesh, Rajasthan, Delhi and parts of Uttaranchal and contributes to over 80 per cent of total food grain production in the country.

The rice-wheat system gained prominence in the country only during post green revolution period. Changes in the varietal scenario supported by area expansion under irrigation and increased use of agro-chemicals resulted in a massive shift in cropping pattern and ultimately into growth of the system in terms of area, production and productivity.

Both rice and wheat being less susceptible to biotic and abiotic stresses compared to the crops easily replaced legumes, oil seeds, maize and low yielding crops like millets especially wherever any kind of development in terms of irrigation infrastructure and improvement in farmers economic conditions took place. In 1960-61, the area under rice and wheat was 34.13 and 12.93 m.ha respectively, which extended to 43.44 and 26.69 m.ha in 1997-98. Thus, the last three decades witnessed overwhelming increase in area and productivity of rice and wheat in the country.

The rice-wheat sequence is not only widely acceptable crop rotation of the division of Gorakhpur, but also considered to be an important production system in the region. About 29 lakh hectares of land is occupied under the sequence in the eastern region of Indo-Gangetic plains.

The productivity of the system is stagnating or even in few years showing a downward trend mainly because of the delayed sowing of wheat after harvest of rice on one hand and due to certain typical agro-ecological situations of cultivation on the other.

METHODOLOGY

Zero tillage technology based wheat cultivation, expanding with an emphasis for making its production more profitable in the new millennium. The Indian Council of Agricultural Research has launched a challenging project entitled "Accelerating the Adoption of Resource Conservation Technology (RCT) for farm Level Impact on sustainability of rice-wheat systems of the Indo Gangetic Plains" under NATP since rabi 2001-02.

Based on Rice-wheat cropping system and other important factors like soil type and existing irrigation sources in all 22 villages falling in the Maharajganj district of U.P. were selected and various factors were studied for due consideration in selection of sites and villages as and when required. The Zero-tilling machines were arranged and supplied by CIMMYT and CIAE, Bhopal under collaborative approach of NDUA & T, Faizabad, U.P. to the re-mandated ZARS-KVK, Basuli, Maharajganj, U.P. The details of area covered under Zero-tillage technology in the Maharajganj district, U.P. are in the Table-I.

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Table 1: Area under Zero-tillage technology in the Maharajganj district, U.P. during Rabi 2001-02 & 2002-03

Year	NEFT Situation:- Irrigated	
	No of village adopted	Wheat area sown under Zero-tillage
Rabi 2001-2002	9	12.9
Rabi 2002-2003	14	53.1

RESULTS AND DISCUSSION

The Zero-tillage technology is not only remunerative but also eco-friendly. It envisages 100 per cent saving in land preparation as wheat sowing is done just after harvesting of preceding rice crop without any ploughing of wheat. Thus in Zero-tillage the soil is left undisturbed from harvest of rice to sowing of wheat. Diagnostic survey of farmer's practices in wheat cultivation clearly brought out that farmers generally do 3-5 ploughing/harrowing. Considering the existing practices, it has been estimated that there is on an average two litre per hectare of diesel saving when sowing was done by Zero till seed-cum-ferti drill machine in both the years.

Initially farmers were reluctant to sow wheat without land preparation. They were anticipating poor seed germination and crop stand but after seeing the encouraging performance of Zero-tillage wheat they are fully convinced with the technology.

Table 2: Economic gains in Zero-tillage (ZT) over conventional tillage (CT) conducted in Maharajganj, U.P.

Particulars	Year	
	Rabi 2001-2002	Rabi 2002-2003
Area (ha)	12.9	53.1
Participatory farmers	9	14
Cost of field preparation under ZT (Rs/ha)	-	-
Cost of field preparation under CT (Rs/ha)	1900	1875
Saving in diesel in field preparation under ZT (lit/ha)	36	38
Saving in diesel in sowing of wheat under ZT (lit/ha)	5	6
Saving in seed (Kg/ha)	45	50
Saving in seed cost and its seedlings (Rs/ha)	540	600
Cost of irrigation in CT (Rs/ha)	1600	1600
Cost of irrigation in ZT (Rs/ha)	1325	1395

Saving over CT in inputs (Rs/ha)	2715	2680
Average yield in ZT (q/ha)	33.00	45.63
Average yield in CT (q/ha)	32.00	44.29
Additional yield over CT (q/ha)	1.00	1.34
Additional gain in yield (Rs/ha)	500.00	670.00
Total profitability gain over CT (Rs/ha) (1+15)	3215.00	3350.00

* Cost of grains yield has been estimated at prevailing market rate i.e. Rs. 500.00 per quintal

Advantage in wheat seeding

The results of nine trials in Rabi 2001-02 and fourteen trials in Rabi 2002-03 conducted in district Maharajganj of U.P. showed that under Zero-tillage about 10-15 days early sowing of wheat is possible over conventional method of sowing (bread casting and mixing of seed in soil by one cross ploughing after field preparation). It is conspicuous from the participatory data recorded in Table-3 that there is an increase of 3.00 quintal per hectare yield over conventional method when sowing was done during November (timely). Similarly, an individual yield of 2.00 quintal per hectare was recorded when sowing was done in December (late sown condition).

Saving in seed and seeding

It is apparent from the data recorded in Table-2 that there is good saving in seed i.e. 45 kg per hectare in 2001-02 and 50 kg/ha in 2002-03. Similar trend was also observed in saving of seed cost and its seeding which amount Rs. 540.00 in 2001-02 and Rs. 600.00 in 2002-03 per hectare.

Saving in irrigation:-

The zero tillage allows 38 per cent saving in water in the first irrigation followed by 34 per cent in second and 25 per cent in third irrigation. It indicates an ample saving in irrigation water. The advantage may be further enhanced when sowing is done early i.e. just after harvesting of rice crop on residual moisture. This will have advantage in terms of water saving specially in our operational area of Maharajganj district, U.P. where sowing can be done on available residual moisture immediately after harvesting of preceding rice crop.

In the areas with the problem of water stagnation, till is attained after several days of rice harvest. Besides other advantage, saving in number of irrigation vis-à-vis time for conceiving one irrigation is inevitable in Zero tillage as compared to conventional tillage.

The population of Phalaris minor was recorded less in zero-tillage plot. Non disturbed soil condition did not provide favourable conditions to seed buried in soil to emerge. Though the number of Phalaris minor per unit area in ZT and CT varied from location but most of the cases number were reduced considerably. It may further be pointed out that the population

Table 3: Effect of sowing time on Phalaris minor intensity and yield of wheat

Block	Village	Farmers name	Sowing date			Advance ment in days over	P. minor intensity (sq-m)	Yield (q/ha)		Increase in yield over CT (q/ha)
			ZT	CT	CT			ZT	CT	
Sisavabazar	(1) Bari	Sri Triyogi	10-11-02	17-11-02	7 DAYS	12	34	52	53.2	3.00
	(2) Barwadwarika	Sri D.N. Singh	13-11-02	18-11-02	5 DAYS	15	36	55	42.1	1.80
Nautanwa	(1) Kaulahin	Sri Gaya Prasad Pandey	22-11-02	30-11-02	8 DAYS	18	33	44	42.1	1.90
	(2) Belava	Sri Awadesh Prasad Dixit	22-11-02	30-11-02	8 DAYS	34	46+	42	41.1	0.90
	(3) Belava	Sri H.K. Pandey	15-11-02	24-11-02	9 DAYS	28	40	30	30	-
Paniara	(1) Khurd Babhanauli	Sri Khalid ahmed Abbasi	28-11-02	10-12-02	12 DAYS	32	49	42	14.1	0.80
	(2) Khurd Babhanauli	Sri Nizamuddin	06-12-02	17-12-02	11 DAYS	31	52	42	40	2.80

of Phalaris minor in timely sown plot was recorded about 45 per cent lesser than late sown condition. However, 34 per cent Phalaris minor intensity has been found less in ZT as compare to conventional tillage technology.

Effect of Zero tillage technology on intensity of Phalaris minor: Phalaris minor in wheat has become a serious problem. It reduces yield considerably. Continuous use of isoproturan for its control has resulted in development of herbicidal resistance in states like Haryana.

Yield Gains

It may be highlighted that 0.80 to 3.00 per quintal hectare more yield of wheat gain was found in zero-tillage plots as compared to conventional tillage plots.

Overall Economic Gains

The over all picture of profitability gains ranges from Rs. 2050.00 to Rs. 4175.00 per hectare due to adoption of zero-tillage technology depending upon the soil type and micro-farming situation. Thus, it clearly reveals that the technology is not only economical but also technologically feasible and viable in the Maharajganj district, Uttar Pradesh where rice-wheat cropping system is widely adopted by resource rich and reasonable poor farmers.

CONCLUSION

The farmers and field functionaries of line department are positive in their attitude about this technology. Farmers feel that the technology is acceptable being simple and economical.

Extension Personnel's Opinion About World Trade Organization Challenges

Lavleesh Garg* and G.S. Saini**

ABSTRACT

A study was conducted in Ludhiana district of Punjab State to know the challenge of WTO to the farmers, extension personnel and the consumers. Due to direct and intensive interaction with scientists, the farmers are progressive and aware of the latest developments in agriculture. Ludhiana district was selected purposively for this study. All the extension personnel of the state department of agriculture, horticulture, and animal husbandry of Ludhiana district were selected for the study. More than 75 per cent of extension personnel observed shift in cropping pattern and cheaper import of agricultural commodities are the major problems to be faced by the Government. About 60 per cent of extension personnel perceived that farmers would face a challenge for getting market and weather information. The extension personnel did not feel that giving information of market intelligence to the farmers is a serious problem. The increase in market competition and demand for better quality are serious challenges to be faced by the farmers. To create post harvest facilities, lot of funds are required thus, it was felt by more than 80 per cent of the extension personnel that it is bound to be a serious problem for the farmers.

In the past the Indian agricultural had been guided mostly by pressing demands for food. In transforming India from food deficit to food surplus country, Punjab has played a pivotal role. According to Singh (2002) the share of different crops by Punjab to the central pool like wheat, rice, cotton was 22, 9 and 24 per cent respectively, while milk, eggs, honey and mushrooms were contributed to the tune of 10, 9, 33 and 22 per cent respectively.

World Trade Organisation (WTO) has developed certain provisions related to agriculture sector. It regulates trade between nations. The main goals of WTO are to help producers of goods and services, exporters and importers to conduct their business. It has basic objective of 'sustainable development' in relation to the optimum use of natural resources by having fair market oriented trading system among different countries through substantial progressive reduction in agricultural support and protection. The Punjab farmers, who have been giving priority to quantity often compromising on quality, are facing tough challenge from other countries and even compromising on quality, are facing a tough challenge from other countries and even from other states within the country in marketing their produce. It poses many serious challenges to farmers and extension functionaries. Keeping this in mind, the present study was conducted with the objectives:-

- To study the opinion of extension personnel regarding the challenges of WTO to be faced by the government.

- To study the opinion of extension personnel regarding the challenges to be faced by the farmers and consumers.

METHODOLOGY

The study was conducted in Ludhiana district of Punjab State. All the extension personnel of the state Department of agriculture, horticulture, and animal husbandry posted in Ludhiana district were selected for the study. The challenges of WTO in agriculture were identified from available literature and through consultation with the extension personnel, experts and the farmers. The opinion of the extension personnel was sought on three point response categories viz. very serious, serious and not serious. The scores ranged from 0 to 36.

RESULTS AND DISCUSSION

Opinion of the extension personnel regarding the challenges to the government, farmers, consumers and extension personnel are discussed as under:

Challenges to the government

From Table 1 it is revealed that majority of the extension personnel (79.5%) opined that national food security will come under threat due to shift in cropping system as our staple food is wheat and rice. Similarly a high percentage of extension personnel (87.76%) reported that cheaper foreign goods would be a big set back to our domestic produce and its market. Many extension personnel (42.86%) perceived that financial loss to

government due to dumping is not a serious challenge to the government.

Table 1: Distribution of the extension personnel according to their opinion about the challenges to be faced by the Government in relation to the provision of WTO in agriculture (N=98)

Challenges of Government	Very serious	Serious	Not serious*
National food security will come under threat due to shift in cropping pattern, as our staple food is wheat and rice.	41 (41.84%)	37 (37.73%)	20 (20.41%)
Cheaper import of agricultural commodity will cause set back to our domestic market and it will loose its balance in future to save the farmers from financial loss due to over production. Govt. may adopt dumping of agricultural produce which will lead to financial loss to Govt.	47 (47.96%)	39 (39.80%)	12 (12.24%)
Creating awareness among farmers regarding quality of produce. Creating infrastructure facilities for farmers like: Processing	12 (12.24%)	13 (13.26%)	73 (74.50%)
Transportation	29 (29.59%)	43 (43.88%)	26 (26.53%)
Marketing	26 (26.53%)	28 (28.37%)	44 (44.90%)
Cold storage	38 (38.77%)	44 (44.90%)	16 (16.33%)
Creating compatibility among farmers to overcome the problems raised due to provisions of WTO	7 (7.14%)	22 (22.45%)	69 (70.41%)
The change to be brought about in agricultural policies.	19 (19.38%)	43 (43.88%)	36 (36.74%)
Creating facility about different inputs like biofertilizers and biopesticides	8 (8.16%)	13 (13.26%)	77 (78.58%)
Providing subsidies (export, domestic support on product and non-product), which are not a given a present in India, will result in extra economic burden on Govt.	21 (21.42%)	37 (37.76%)	40 (40.82%)
Creating awareness among the farmers about the efficient use of inputs	29 (29.59%)	29 (29.59%)	40 (40.82%)
Taking steps to stop child labour in agriculture sector	11 (11.22%)	31 (31.63%)	56 (57.15%)
Striking a balance between farmers and consumers interest.	17 (17.35%)	17 (17.35%)	64 (65.30%)
*Multiple responses	26 (26.53%)	38 (38.77%)	34 (34.70%)

More than 70 per cent of the extension personnel suggested that creating infrastructure facilities was serious challenge to government. More than 70 per cent of extension personnel expressed that bringing changes in agriculture policy was not a serious challenge to government. More than 40 per cent of the extension personnel expressed that transportation, providing inputs like biopesticides, biofertilizer and subsidies to the farmer were not a serious challenge for the government. The reason for greater response towards non-seriousness was that the extension personnel felt that government was the ultimate authority to do anything. So they felt that if government feels anything should be done then it can do it. That is why more

number of extension personnel did not find it a serious challenge to Government. Rawat (2003) reported that due to poor economic conditions Indian Government faces serious challenges in providing more subsidies and infrastructure facilities to the farmers.

Level of seriousness to government

It was interesting to note from the Table 2 that an equal percentage (39%) of the extension personnel felt that the provisions of WTO in agriculture would provide serious and non-serious challenges to the government. It showed that the opinion of the extension personnel regarding the challenges is divided. However about one fourth of the extension personnel considered the WTO as a very serious challenge to the government.

Table 2: Distribution of the extension personnel according to the level of seriousness of the challenges to be faced by the Government due to provision of WTO in agriculture (N=98)

Level of challenges	Frequency	Percentage
Low (0-18)	38	38.78
Medium (9-19)	38	38.78
High (20-32)	22	22.44

Challenges to the farmers

As shown in Table 3 more than half of the extension personnel reported that lowering of the domestic price of produce will be a serious challenge to the farmer in terms of disposal of their produce. Due to use of more quantities of fertilizer and pesticides in agriculture to obtain higher yield, it is difficult for farmers to lower the cost of production. Hence the extension personnel expressed this as a serious challenge for the farmers

Table 3: Distribution of the extension personnel according to the challenges to be faced by the farmers due to provision of WTO in agriculture (N=98)

Challenges of the farmers	Very serious	Serious	Not serious*
Related to marketing			
Cheaper import to agriculture goods due to lower tariff wall with result in lowering the domestic price of produce	53 (54.1%)	31 (31.63%)	14 (14.27%)
Cost of production has to be lowered (43.8%)	43 (45.92%)	45 (10.25%)	10
Non product subsidy limited to a maximum of 10 per cent in individual products	43 (43.88%)	35 (35.71%)	20 (20.41%)
Product subsidy limited to 13.3 per cent in individual products	43 (43.88%)	35 (35.71%)	20 (20.41%)
Market competition will increase (54.1%)	53 (54.1%)	31 (31.62%)	14 (14.27%)
Market intelligence is required to know the price according to location, demand of products, past, present, future price of the produce	19 (19.39%)	21 (21.42%)	58 (59.18%)

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Related to production

Pressure of quality production under WTO demand	51 (52.04%)	27 (27.55%)	20 (20.41%)
Due to patent of products input cost will increase and commercial production of patent material will not be allowed	42 (42.86%)	36 (36.73%)	20 (20.41%)
Eco-friendly agriculture technology should be adopted by the farmers	37 (37.76%)	37 (37.76%)	24 (24.48%)
Greater use of bio-fertilizers and bio-pesticides	35 (35.71%)	37 (37.76%)	26 (26.53%)
Less use of chemical fertilizer and pesticide in agriculture	33 (33.67%)	31 (31.63%)	34 (34.70%)

Related to Research and Extension

Getting information about market, weather conditions and remote sensing through cyber access	24 (24.49%)	59 (60.21%)	15 (15.30%)
To follow the set procedure for intellectual property rights	42 (42.86%)	36 (36.73%)	20 (20.41%)
Making of Trade mark for standardizing their products	26 (26.51%)	53 (54.1%)	19 (19.39%)
Creation of post harvest facilities to sustain and get more profit in competitive world	39 (39.80%)	47 (47.96%)	12 (12.24%)

Related to Export/Import

To get license for trading of product	30 (30.61%)	25 (25.51%)	43 (43.88%)
Getting proper knowledge about export procedure, rules and regulations	42 (42.86%)	38 (38.78%)	18 (18.36%)
More import duty by the developed countries the product prepared in our country by using cheap labour, child labour, migratory labour	30 (30.61%)	46 (46.94%)	22 (22.45%)

*Multiple responses

Khet et al (1999), Damodaran (2001) and Krishnamurthy and Sharatchandra (2001) reported that increase in cost of cultivation is a major constraint to the farmers and the findings of the present study were also in tune. Majority of the extension personnel felt that the putting limit on non-product and product subsidies in relation to farmers' produce would be a serious problem. Like wise, patent of products will be a serious problem to farmers, as it will increase input cost because the farmers will not be allowed to produce patent material on commercial scale.

Chaudhary (2002), Hasib (1996) and Sundaram (2003) reported that patenting of plant and seed varieties resulted in increase in input cost and made farming costlier and resulted in monopolisation of market as a serious problem and the findings of the present study stressed the point further. About 60 per cent of extension personnel felt that farmers will face a challenge for getting market and weather information. The extension personnel did not feel that giving information of market intelligence to the farmers is a serious problem. The increase in

market competition and demand for better quality is a serious challenge to be faced by the farmers. More than 80 per cent of the extension personnel felt that creations of post harvest facilities would necessitate lot of funds. Non-availability of information about export procedure, rules and regulations etc will also pose a serious problem for the farmers.

Level of seriousness of the challenges to the farmers

Data in Table 4 indicated that about 48 and 33 per cent of the extension personnel felt that the different provisions of WTO in agriculture would be medium and high level challenges to the farmers, respectively.

Table 4: Distribution of the extension personnel according to the level of seriousness of the challenges to be faced by the farmer due to provision of WTO in agriculture (N=98)

Level of challenges	Frequency	Percentage
Low (0-18)	19	19.39
Medium (19-26)	47	47.96
High (27-36)	32	32.65

Challenges to the consumer

It is evident from Table 5 that more than three-fourth of the extension personnel opined that due to increase in tariff walls as well as monopolisation of product under patent, the cost of the material will be more and hence the consumer has to pay more for such items. Chaudhary (2002), Hasib (1996) and Sundaram (2003) reported that patenting of plant and seed varieties resulted in an increase in the cost of the product and the findings of the present study were also in line.

Table 5: Distribution of the extension personnel according to the challenges to be faced by the consumers due to provisions of WTO in agriculture (N=98)

Challenges to consumer	Very Serious	Serious	Not serious*
Consumer has to pay more due to increase in tariff walls	30 (30.61%)	46 (46.94%)	22 (22.45%)
Consumer has to pay more due to monopolisation of product under patent	42 (42.86%)	44 (44.90%)	12 (12.24%)

Challenges to the extension personnel

Lack of knowledge about creating motivation and increasing risk bearing capacity of the farmer were the serious challenges to be faced by the extension personnel. As revealed from Table 6 about 43 per cent of the extension personnel felt that the transfer of information about how to decrease cost of production while maintaining the production level is a serious challenge to them. It is not the job of extension personnel to create market for agriculture produce of the farmer thus they felt it as a serious problem.

Majority of extension personnel (78.56%) reported that to collect farmers for co-operative or collective marketing is a serious challenge to them. It may be due to social set up, social system, and egoism, self-centred nature due to which the farmers do not join hands with each other. More than fifty per cent of the extension personnel opined that creating awareness among the farmers about the pros and cons of WTO, solution of providing appropriate technology solutions to overcome the barriers of WTO, training farmers for hi-tech agriculture, organizing farmers for contract farming and improving their technical competency are not serious challenges to them.

Table 6: Distribution of the extension personnel according to the challenges to be faced by them due to provision of WTO in agriculture (N=98)

Challenges to extension personnel	Very serious	Serious	Not serious*
Enhancing the risk bearing capacity of farmers	12 (12.24%)	62 (63.27%)	24 (24.49%)
Creation of market for agricultural produce	12 (12.24%)	62 (63.27%)	24 (24.49%)
Organizing farmers for collective like co-operative marketing	15 (15.30%)	62 (63.27%)	21 (21.43%)
Creating awareness among the farmers about the pros and cons of WTO	12 (12.24%)	30 (30.61%)	56 (57.15%)
Selection of appropriate technology to overcome the barriers of WTO	14 (14.28%)	30 (30.61%)	54 (55.11%)
Reduction in the cost of production	16 (16.32%)	42 (42.86%)	40 (40.82%)
Training farmers for high skill farming	12 (12.24%)	19 (19.39%)	67 (68.37%)
Organizing farmers for contract farming	14 (14.28%)	22 (22.45%)	62 (63.27%)
Improving self technical competency	9 (9.18%)	13 (13.26%)	76 (77.56%)

*Multiple responses

Level of seriousness of the challenges to be faced by the extension personnel

It is observed from table 7 that about 41 per cent of the extension personnel felt that the challenges posed by WTO were serious to them.

Table 7: Distribution of the extension personnel according to the level of seriousness of the challenges to be faced by them due to provisions of WTO in agriculture (N=98)

Level of challenges	Frequency	Percentage
Low (0-3 scores)	58	59.18
Medium (4-8 scores)	22	22.45
High (9-18 scores)	18	18.37

It is clear that they require educational motivation to get equipped themselves in transferring the agricultural technology and preparing the farmers to face these challenges.

CONCLUSION

It is concluded that extension personnel observed that shift in cropping pattern and cheaper import of agricultural commodities are the major problems to be faced by the Government. About 60 per cent of extension personnel perceived that farmers will face a challenge for getting market and weather information. The extension personnel did not feel that giving information of market intelligence to the farmers is a serious problem. The increase in market competition and demand for better qualities are serious challenges to be faced by the farmers. Non-availability of information about export procedure, rules and regulations etc, will also pose a serious problem for the farmers. Extension personnel felt that the transfer of information about how to decrease cost of production while maintaining the production level is a serious challenge to them.

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Institutional Training Programmes: Perception of Extension Personnel

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ABSTRACT

Punjab is agriculturally progressive and a major contributor to national food reserve. To propel Punjab agriculture into 21st century, technical skill and management of agriculture manpower must improve in consonance with the rapidly changing need of society both nationally as well as internationally. The present study on institutional training programmes showed that most of the extension personnel were satisfied with the contents covered in the training programmes, place of training and training schedule but were dissatisfied with the theory-practical ratio, duration, selection of trainee and training notification. The respondents were quite satisfied with the physical arrangements made in the training programmes. Training areas preferred by extension personnel were use and handling of audio-visual aids, training planning and implementation and subject matter technology.

Over the years, agricultural technology has changed rapidly. New ideas and development are taking place continuously as a result of research and communication. The dynamic environment and fast changing technology has resulted in shrinking the cycle of learning, applying and relearning. These changes have brought in the necessity for change and improvement in competencies of people in all walks of life. Globalisation, liberalisation and market-oriented economy have also added new dimensions. Similarly in agriculture, the standards of professional efficiency and competency are constantly rising due to explosion of technology. In view of the changing scenario, the extension personnel require latest knowledge and skill for educating and training the farmers. Punjab Agricultural University (PAU), Ludhiana as resource organisation in the Punjab state, share a major responsibility in promoting professional competency of the extension personnel of various development departments including agriculture department of the state. The present study was undertaken to know the opinion of the extension personnel towards different aspects of training programmes.

METHODOLOGY

The study was carried out in the three purposively selected districts of Punjab state viz. Ludhiana, Jalandhar and Amritsar. All Agriculture Development Officers (ADOs) working at the district headquarters and block level were taken as the respondents. In all, 148 ADOs were selected for this study. All institutional training programmes organised for the year 1999-2000 at PAU were considered for the purpose of the study. Keeping in view the objectives of the study, a questionnaire was designed for the collection of data by consulting relevant

literature and concerned experts in the field. The data were collected through distributed questionnaire approach. Analysis of the data was done through frequency distribution and mean score.

RESULTS AND DISCUSSION

Opinion of the extension personnel regarding the contents covered in training programmes

About 75 per cent of the respondents were of the opinion that the contents covered in the training programme were upto date while 69 per cent and 68 per cent opined it to be need based and accurate respectively. Further the contents were found to be applicable and timely by 61 per cent of the respondents. A little less than half (44 per cent) of the respondents were of the opinion that the contents were flexible. Majority of the extension personnel were found satisfied with the contents covered in the training programmes.

Opinion of the respondents about general aspects of the training programmes

The study revealed that 97.10 per cent of the respondents were satisfied with the place of training, training schedule (91.31 per cent) and with the break time during the training (98.55 Percent). Training time was found to be suitable to 88.40 per cent of the respondents. Regarding training frequency and training notification, the respondents were divided in almost equal halves while giving their opinion. A little more than half (42.02%) of the respondents were dissatisfied with the duration as well as selection of trainees. The duration of most of the training was 2-4 days, which was found to be short by the extension personnel. The main reasons of the dissatisfaction

with the duration as well as selection of trainees. The main reasons of the dissatisfaction with regard to selection of trainees as felt by the respondents were that selections were neither based on qualifications nor on interest, rather repeated deputing was done. The study showed 85.87 per cent of the respondents preferred 40:60 theory to practical ratio. This clearly indicated that more practical should be incorporated in the training programmes.

Extent of use of different training methods in the training programmes majority of the respondents expressed that

All the respondents reported that lecture method was used always work whereas demonstration (88%), field trip (80%) and practical (78%) were used sometimes (Table 1). Further, ranks were assigned to the different training methods and from the weighed scores it was clear that lecture method was the most commonly used method followed by lecture-cum-discussions. Field trip, demonstration and practical work were used to a lesser extent by the trainers.

Table 1: Extent of use of different training methods in the training programmes (N=138)

Training Methods	Always f %	Sometimes f %	Never f %	Total Score	Rank
Lecture	138 100	-	-	410	1
Demonstration	10 7.24	122 88.42	6 4.34	280	4
Lecture cum discussion	46 33.3	486 62.32	6 4.34	316	2
Field trip	22 15.94	110 79.72	6 4.34	292	3
Seminar	-	38 27.54	100 72.4	616	6
Symposium	-	25 18.11	113 81.8	9163	7
Brainstorming sessions	-	20 14.50	118 85.5	9158	9
Buzz sessions	-	22 15.95	116 84.0	5160	8
Practical work	10 7.24	108 78.26	20 14.5	236	5

Preference of respondents to different training methods

Data in Table 2 clearly indicate that lecture-cum-discussion was the most preferred method with highest score of 972, followed by practical, field trip and demonstrations.

Opinion about the organisational aspects of training programmes

The study revealed that majority of the respondents were satisfied with different organizational aspects of the training programmes viz. reception (86.96%), inaugural sessions (85.50%), concluding sessions (82.60%), and an equal percentage (79.72%) were satisfied with the orientation and intra contact. However, 70.28 per cent of the respondents were dissatisfied with the educational visits and a little more than half of the respondents were dissatisfied with the recreational visits. The respondents opined that the educational visits and recreational visits were of short duration. Moreover, repeated visits were made to the same place and also the frequency of these visits was very less.

Table 2: Distribution of the respondents according to the order of preference regarding the different training methods to be used in the training programmes (N=138)

Training methods	1	2	3	4	5	6	7	8	9	Total Score	Rank
Lecture only	F 4	4	6	8	4	12	0	24	76		
(%) 2.89	2.89	2.89	4.34	5.79	2.89	18.84	-	17.39	55.07	328	9
Score	36	32	2	8	0	26	0	44	76		
Lecture-cum-discussion	F 34	40	20	6	24	8	6	0	0		
(%) 24.63	28.98	14.49	4.34	17.39	5.79	4.34	0	0	0	972	1
Score	306	320	140	36	120	32	8	0	0		
Field trip	F 26	26	30	26	8	6	0	0	0		
(%) 18.84	18.84	21.72	20.00	5.79	4.34	-	0	0	0	944	3
Score	214	208	210	216	40	24	-	-	-		
Demonstration	F 24	36	40	14	8	2	0	0	14		
(%) 17.39	26.08	28.98	10.14	5.79	1.44	-	-	-	10.14	930	4
Score	216	288	280	84	40	8	-	-	14		
Practical work	F 34	26	24	30	16	0	8	0	0		
(%) 24.63	18.84	17.39	21.72	11.50	-	1.702	-	-	-	966	2
Score	306	208	168	180	80	0	4	0	0		
Exhibition	F 0	0	0	38	46	30	10	14	0		
(%) -	-	-	-	27.53	33.3421	21.73	7.243	10.14	-	636	5
Score	0	0	0	228	220	120	72	140	0		
Panel discussion	F 0	0	0	0	18	46	42	30	4		
(%) -	-	-	-	-	13.0433	33.34	30.43	21.73	2.89	464	6
Score	0	0	0	0	90	184	126	84	10		
Seminar	F 14	0	0	6	18	18	38	34	10		
(%) 10.14	-	-	-	4.34	13.0433	13.04	27.53	24.63	7.24	390	8
Score	126	0	0	36	90	72	114	58	33		
Brainstorming	F 0	6	0	0	8	20	8	26	26		
(%) -	4	-	-	-	5.79	14.49	5.79	18.84	18.84	402	7
Score	0	48	-	-	48	100	32	78	52		

Extent of use of different teaching aids in the training programmes

It can be inferred from the data in Table 3 that chalk board was the most commonly used nonprojected aid as expressed by 94.22 per cent of the respondents. Among the projected aids, overhead projector was the only aid reported to be used always in the training programmes by 34.80 per cent of the respondents. Display board, graph and photographs were used sometime by 73.19, 68.12 and 62.32 per cent of the trainers, respectively.

Table 3: Extent of use of different teaching aids in the training programmes teaching aids

Teaching aids	Always f (%)	Sometimes f (%)	Never f (%)	Rank (%)
I. Non Projected aids				
i) Chalk board	130 94.22	8 5.78	-	1
ii) Display board	25 18.12	101 73.19	12 8.69	6
iii) Flannel board	-	6 4.35	132 95.55	12
iv) Magnetic Board	-	2 1.45	136 98.55	13
v) Posters	44 31.89	82 59.42	2 8.69	4
vi) Charts	42 30.44	82 59.42	14 10.14	5
vii) Photograph	46 33.33	86 62.32	6 4.35	2
viii) Graphs	20 14.49	94 68.12	24 17.39	8

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(x) Models	-	-	37	26.81	101	73.19	9
(x) Specimen	45	32.60	65	47.11	28	20.29	7
2. Projected aids							
(i) Overhead projector	48	34.80	82	59.42	8	5.78	3
(ii) Movies	-	-	20	14.49	18	85.51	11
(iii) Video Cassettes	-	-	22	15.95	116	84.05	10
(iv) Computers	-	-	2	1.45	136	98.55	14

Opinion regarding the performance of the trainers

The data in the Table 4 show that 76.81 per cent of the respondents opined high level performance with respect to subject matter knowledge of the trainers. The data further revealed that 65.21 per cent and 62.31 per cent of the respondents felt moderate level of performance of trainers with regard to making the presentation interesting and speed of presentation, respectively during the training programmes. About 71 per cent of the respondent felt that trainers performance was moderate in selection of appropriate aids and in addition the trainers performance was expressed to be moderate in the use of training methods by 86.96 per cent of the respondents. The trainers were found self-confident as 56.52 per cent of the respondents felt their performance to be high, while 43.48 per cent reported it to be moderate. With regard to encouraging participation and skill in human relations during the training programmes, 56.52 and 50.72 per cent of the respondents reported moderate level of performance of trainers. However, 59.43 per cent of them indicated low level of performance with regard to trainers' ability to admit mistakes.

Table 4: Distribution of the respondents according to their regarding the performance of the trainers.

Items	High f (%)	Moderate f (%)	Low f (%)
1. Subject matter			
1) Knowledge	106 76.81	32 23.19	-
2) Clarity	60 43.48	72 52.19	6 4.35
3) Organization	42 30.43	92 66.67	4 2.90
4) Simplicity	56 40.58	76 55.07	6 4.35
2. Presentation			
1) Speed	52 37.69	86 62.31	-
2) Interesting	36 26.09	90 65.21	12 8.70
3. Use of AV Aids			
1) Skillful in handling	74 53.63	48 34.78	16 11.59
2) Appropriateness of aids	32 23.19	98 71.02	8 5.79
4. Use of training methods	12 8.70	120 86.95	6 4.35
5. Personal traits			
1) In Human relation	48 34.78	70 50.72	20 14.50
2) Self confidence	78 56.52	60 43.48	-
3) Ability to admit mistakes	5 3.57	48 34.78	82 59.43
4) Encourage participation	46 33.34	78 56.52	14 10.14

Opinion about physical facilities

The study revealed that 84.06 per cent of the respondents were satisfied with the canteen and drinking water facility provided during the training programmes and an equal percentage of the respondents (79.71%) were satisfied with the seating arrangements library and boarding facility. Majority of the trainees (78.26%) were satisfied with both audio - visual equipment and lodging facility provided during the training programmes. However 70.29 per cent of the were not satisfied with the transportation facility.

Opinion about usefulness of training programmes

The data in Table 5 show that 95.63, 94.20 and 84.05 per cent of the respondents opined that the training programmes brought positive change in them in terms of skill, knowledge and attitude, respectively. Further 94.20 and 85.50 per cent of the respondents felt that the training programmes were helpful in exchange of experience and updating subject related information, respectively and 84.05 per cent of them were of the view that training facilitated in improving linkage between research and extension.

Table 5: Opinion of respondents about the usefulness of training programmes. (N=138)

Different aspects of usefulness	Yes f (%)	No f (%)
Positive change in		
a Knowledge	130 94.20	8 5.80
b Skill	132 95.63	6 4.35
c Attitudes	116 84.05	22 15.95
Helps in updating subject related information	118 85.50	20 14.50
Improves linkage between research and extension	116 84.05	22 15.95
Help in exchange of experience	130 94.20	8 5.80

CONCLUSIONS

It can be concluded that majority of the extension personnel were satisfied with place of training, time suitability and schedule but dissatisfied with the duration, selection of trainee, training notification, and theory to practical ratio. Most commonly used method during the training courses was found to be lecture method whereas lecture - cum - discussion, practical work and field trip were the first three preferred method by respondents. Majority of the respondent were satisfied with reception, orientation, inaugural and concluding sessions of training programmes. Chalk board was the most commonly used non - projected aid whereas overhead projector was commonly used among the projected aids. The extension personnel were found satisfied with the performance of trainers and physical facilities except transport facility. The respondents believed that training programmes brought positive changes in

them in terms of knowledge, skill and attitude. The most preferred training areas were handling of audio-visual aids training and implementation and the preferred interval for training programmes was one year.

The extension personnel should be given proper motivation and encouraged to participate in the training programmes by sending notification in time. Opportunities should be provided to different extension personnel in different training programmes. More number of training programmes should be organized pertaining to emerging issues like sustainability in agriculture through diversification, motivating farmers to

reduce agricultural pollution, etc. Duration of the training should also be increased and the trainers should make maximum use of the advanced methods of teaching and audio-visual aids. The trainers need to emphasize more on practical and problem solving training methods rather than theoretical portions of the subject matter. Incorporation of various practical and field visits should be done in the training programmes. The extension personnel can be taken on educational tours to various agricultural institutes and private agencies to analyze latest field and market situations. Transportation facilities should also be improved to attract more trainees.

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Participatory Approach for Dissemination of Technologies

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ABSTRACT

The study revealed that overall participation was about 52 per cent at three stages of participation namely planning, execution and management. Water resources were generated with the active participation of beneficiaries, resulting in increased crop production and productivity.

The Institute Village Linkage Programme (IVLP) was implemented in 1999 with the World Bank support in participatory mode in four villages of Raipur block. The approach was bottom-up with an objective to plan and execute interventions by stakeholders according to the need and problem. The strategy for transfer of technology was of specific nature. It did not involve general extension activities that are usually carried out for development of agriculture. Interventions were executed in the form of on-farm trials and verification trials. Stakeholders were motivated to participate at every stage of programme namely, planning, implementation and management. During planning of the project, at initial stage, they had to conduct agro-ecological analysis through which problems were identified and prioritized. There was a paradigm shift of participate empowering beneficiaries to in development so as to augment and sustain production. Natural resources were managed in participatory mode through community action for equal sharing of resource among the community members. Stakeholders constituted Users Groups for proper management and maintenance of the village resource. Farmers worked hand in hand in the project with professionals as partners of the enterprise. Stakeholders were the decision-makers whereas professionals were facilitators to guide for improvement in socio-economic condition. The article deals with the study of participation during the project period (1999-2005) in each stage of programme implementation and dissemination of technologies in adopted villages. The success of technology transfer is valued when it gets extrapolated to other villages. Participation of farmers has been worked out in different interventions executed in IVLP villages.

METHODOLOGY

Interventions in Institute Village Linkage Programme have been implemented in participatory mode and stakeholders have been actively involved in putting their labour input at every

stage of the programme namely, planning, implementation and management for sustainability, productivity, stability, equity and profitability. Having achieved success in augmenting crop production, generation and management of water resources, developing horticulture, introducing agri-horti system, income generating activities, livestock interventions and human resource development in IVLP villages, it was important to assess participation of stakeholders in the programme. An investigation for this purpose was undertaken from 403 farmers through a methodology adopted from a participatory research conducted earlier (Bagdi 2002). Based on the methodology, information was collected on three point continuum scale (yes, some what and no), tabulated and analysed for interpretation of results. Participatory index was worked out using the following formula (Bagdi et al. 2002):

$$PPI = \frac{\text{Mean participation score (P)}}{\text{Maximum participation score}} \times 100 \quad \text{--- (i)}$$

Where,

$$P = \frac{\sum_{j=1}^N P_j}{N} \quad \text{--- (ii)}$$

Where,

N = Total number of respondents

$$P_i = \frac{\sum_{j=1}^k (PP_j + PE_j + PM_j)}{k} \quad \text{--- (iii)}$$

Where

PP_j = Score for jth statement regarding participation in programme planning.

PE_j = Score for jth statement regarding participation in programme execution.

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PM_j = Score for jth statement regarding participation in programme maintenance.

K = Total no. of statements on which responses of beneficiaries were collected.

The results were interpreted with suitable statistical tools.

RESULTS AND DISCUSSION

Findings of the investigation (Table-1) revealed that overall participation of stakeholders was about 52 per cent at three stages of the project, namely, planning, execution and management. The score maximum at the stage of execution of interventions (58 per cent) whereas at management stage their participation was 51 per cent followed by 46 per cent at planning stage.

Table 1: Overall average participation of stakeholders in programme implementation

Phase	Soda Saroli	Bhopal Pani	Kalimati	Badasi	Average
Planning	47.73	45.17	45.30	45.40	46.05
Execution	57.98	55.92	58.39	59.43	58.33
Management	47.06	54.77	56.97	51.27	51.04
Total	50.92	51.96	53.56	52.30	51.81

Result was significantly positive because objective of the programme envisaged that professionals and farmers should work as partner for execution of activities and equal sharing of the output. Verification trials and on-farm trials were conducted at field level in which stakeholders contributed their labour input during execution of interventions. Professionals contributed them as external material for support in order to accomplish success. Water resource was generated with active participation of beneficiaries in which labour inputs and local materials for the harvesting structure were arranged by them.

Development of horticulture at adopted villages were executed in participatory mode. Farmers dug out pits and filled them with pit filling mixtures and available compost. Before plantation, these pits were verified and counted by professionals so that samples could be provided to the real beneficiaries in villages.

Major interventions in IVLP Programme were crop based with a view to enhance agriculture production and accomplish sustainability alongwith profitability. Crop production in hill and mountain ecosystem was very low and below subsistence level because of geographical reasons. Agriculture in this region was risk oriented and crop production was rain dependent. The data in table-2 reveal that average participation of farmers for crop based intervention was 54 per cent where as at execution level the participation was 59 per cent due to verification and on farm trials in their field, followed by 55 per

cent and 47 per cent at crop management and planning stage, respectively.

Table 2: Farmers participation for crop based intervention in IVLP

Phase	Soda Saroli	Bhopal Pani	Kalimati	Badasi	Average
Planning	49.72	46.51	48.67	46.54	47.65
Execution	59.63	56.12	64.43	58.16	58.75
Management	55.27	55.79	62.69	54.61	55.63
Total	54.87	52.81	58.60	53.10	54.01

Institute Village Linkage Programme was implemented in rainfed farming situation at four villages. Before launching of the project at the initial stage, agro-eco analysis exercise was conducted to know the ground realities and problems of adopted villages. Through spot analysis it was revealed that scarcity of water was topping the list of problems of stakeholders. They agreed for generation of water source in participatory mode. They also agreed to contribute their labour input for managing the resource to have better crop production. Accordingly, water harvesting structure was planned and dug out with their active participation. Their traditional wisdom was valued and used in locating the spot in field for the structure. Generated water source was managed through Water Users Society for equality and creating social fund for maintenance of the system. Stakeholders collected social fund to repair assets available for community. The idea was that the resources created should be sustainable, stable and accessible to stakeholders for cultivation.

The data in Table-3 show that on an average 60 per cent stakeholders participated in generating water resource. They contributed 53 per cent participation at execution stage and about 78 per cent at the stage of management. A water harvesting tank of (21m x 8m x 2m) was constructed to irrigate 200 bighas (16 ha) of land at village Kalimati and beneficiaries were 50 farm families. The extent of water harvested was so much that stakeholders were able to provide three irrigations to their crops in rabi season. The harvested water was shared through underground pipelines system 1.68 km away, with village Bhopalpani to irrigate about 320 bighas (25ha) of land. Sustainability for crop production was visible because of availability of water and production area under irrigation increased from 5 ha to 22 ha at village Kalimati. Area under cultivation had enhanced from 4.8 ha to 20 ha at village Bhopalpani due to water resource management intervention was visible as yield of wheat crop augmented from 19 G/ha to 30-33 G/ha. This technology was extrapolated at another village and farmers attempted to generate water resource in their village to transport water from primary resource available in the forest

area at the distance of 3km. They made tireless efforts to establish underground convey system using G.I. pipeline. It was managed for all farm families (45) living in the village. In order to irrigate lands near their home close to agricultural land risers having 13 liter/second discharge were installed. Users Group and Society was constituted to generate social fund for effective and proper management of the resource. Stakeholders of village Bhopalpani felt that the amount of water collected in the structure in the tank at Kalimati might not be sufficient for two villages simultaneously at a time. In order to mitigate of water scarcity problem for irrigation, villages constructed one more water harvesting structure in participation mode alongwith a cutoff wall on the river drainage system at village Kalimati to supplement water to the tank. They contributed 51 per cent labour input for the purpose whereas CSWCRTI, Dehradun provided them external material to the tune of 49 per cent of the total cost.

Table 3: Farmers participation in generation and management of water resources

Phase	Kalimati Badasi	Bhopalpani	Average
Planning	42.22	51.67	47.5
Execution	53.89	53.24	52.5
Management	79.44	76.62	78.04
Total	58.52	62.62	59.35

Agriculture in bouldery and stony lands was another problem being faced for crop production. Most of the lands were not suitable to agriculture. The best option available for stakeholders was developed of horticulture. In hills there were immense potentialities to develop horticulture for cultivation of fruits. Through agroecological analysis it was found that horticulture was under developed in IVLP adopted villages, except for a few old mango trees. Interventions for development of horticulture were executed in participation approach and now, there were more than ten thousand mango (Dashhari) grafted trees and about one thousand in situ grafted mango plants in four villages. It constituted 64 orchards. It was compulsory to plant at least five mango grafted plants at initial stage of the programme nearby their homestead in participatory mode. Gradually, fruit trees plantations were increased in four villages and at present there are sufficient plantations for which farmers contribute their labor input in digging pits, filling mixture, and management of plants. The Institute provided them mango saplings and technical guidance. As required, farmers were trained in situ grafting to make use of this skill in developing horticulture.

Participation for agri-horti system has been depicted in Table 4. It was found that on an average there was 54 per cent participation of stakeholders in this intervention and at tie execution stage 64 per cent participation had been observed by

them followed by 52 per cent at the stage of management and about 44 per cent at planning stage.

Table 4: Farmers participation for agro-horti system

Phase	Soda Saroli	Bhopal Pani	Kalimati Badasi	Average
Planning	44.72	43.71	45.79	43.15
Execution	62.78	65.43	57.37	64.75
Management	45.83	56.29	47.37	54.66
Total	51.11	55.14	50.16	53.63

Livestock interventions to improve animal health and to augment milk production was an important component of IVLP. Crop cultivation is the mainstay for livelihood of hill farm communities. Animal husbandry is a part and parcel of agricultural activities. In hills, animal health is by and large poor due to non-availability of fodder. Information relevant to fodder management were introduced in IVLP for improving animal health. Some of them for improving animal health were urea-treatment to have palatable fodder, uses of UMMR, endo and exoparasite control, vaccination for control of FMD and use of Belimanthus Bolus for Goats to increase body weight. Stakeholders indicated their interest and participated in accepting the technology. The idea to develop poultry with Guinea fowl birds became popular because of good profit and low cost in keeping up these birds. It was found that by using above techniques, milk yield in buffalo and cow enhanced in a very short period. Health of draught animals improved to take more work for agricultural operations.

Information with respect to farmers' participatory approach for livestock intervention have been depicted in Table 5. It reveals that on an average farmers participation was about 48 per cent in this intervention during programme period. Participation was maximum at execution stage (57%) followed by 46 per cent at planning and 40 per cent at management stage. Management of animal component in agriculture needs more attention at planning level for better results. Farmers know importance of this component and extended their participation for improvement at planning, execution and management level of intervention.

Table 5: Farmers participation in livestock interventions

Phase	Soda Saroli	Bhopal Pani	Kalimati Badasi	Average
Planning	47.56	45.56	44.38	46.69
Execution	56.05	51.56	57.50	56.77
Management	38.37	40.89	43.75	40.92
Total	47.33	45.78	48.12	47.81

CONCLUSION

Effective transfer of agricultural technologies requires meticulous planning to ensure stability in production and profitability. Participatory mode of development generates an opportunity to stakeholders for exploring developmental perspectives at the village level. It considers individual as well as community preferences on various priorities for augmenting sustained agriculture production, managing more income, poverty alleviation and overall changes in rural economy.

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Blending of improved and rural technologies shows the way to develop agricultural in rural areas. Interventions needs to execute professional and stakeholders in participatory mode. In this process stakeholder get motivated for taking part in activities for improvement in agriculture enterprises. Stakeholders feel empowered and strengthen for effective utilization for available resource in augmenting production. Awareness for ultimate land use along with use the land as per suitability leads to have proper land use and their utilization.

Adoption of Soil Water Conservation Technologies

Nirmal Kumar*

ABSTRACT

A study was undertaken with the objective of investigating the adoption behavior of the farmers towards soil and water conservation technology. Awareness about soil and water conservation (SWC) practices was positively related with adoption. The overall awareness about the SWC practices was medium. Adoption of various SWC practices was relatively low. The farmers also believed that the practices which they were following were helping them since long to conserve soil and water economically. It may be concluded that low cost or no cost biological and mechanical water conservation technologies suitable to small farm holding should be developed for their easy adoption and farmers should be motivated for their collective participation in adoption of the same.

To boost the rural economy, ground water development as well as conservation of rain water is very important to supply water for agriculture. It will help in replenishing water. Conservation of rainwater is done by several measures. There is need for a blend of all types of traditional water conservation techniques with current technologies. The adoption of soil and water conservation technologies by farmers depends upon the topography of land and resources available with the adopters. Some people in villages adopt new technology immediately and put them into practice. It may be because the technologies were suitable to their field conditions.

Development of surface irrigation and its maintenance was traditionally a cooperative venture, which was closely related to the existing social structure. Beneficiaries formed a set of rules, some of which were accepted by all. But over a period of time, water users' participation in water source maintenance has decreased. It is time to revive, reconstitute the early method so that numerous water sources such as tank, which are debilitated and defunct today can be rehabilitated. Keeping in view the different aspects of soil and water conservation the study was undertaken with the following specific objectives:

1. To study the perception of soil and water conservation practices (SWCPs) by the farmers.
2. To know the attitude of the farmers about SWCPs
3. To study the awareness and adoption of different SWCPs
4. To know the reasons for low/no adoption of SWCPs

METHODOLOGY

The study was conducted in Rajgarh and Vidish district of Madhya Pradesh. Two villages from each district was randomly

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chosen for the study. Forty farmers from each of the four villages were selected randomly. Thus a total of 160 farmers formed the sample of the study. A list of the soil and water conservation practices recommended were collected from the scientists and subject matter specialists.

Perception of SWCPs

To assess the usefulness of each of the selected SWCPs, a list of practice was prepared in consultation with the experts of soil and water conservation. The response for each practice was collected on three point continuum scale i.e. useful, less useful and undecided and denoted in frequency and percentage.

Attitude toward SWCPs

Attitude is the degree of positive effect of the farmers towards soil and water conservation practices. It has immense relevance to their adoption. A list of items related to SWCPs was prepared by reviewing the literature and in consultation with the experts. Responses were invited on three point continuum; agree, disagree and undecided and data were presented in percentage for interpretation of the findings.

Awareness about SWCPs

To know the awareness perception of SWCPs by the farmers, they were directly asked about each of the recommended conservation practices. The farmers giving the exact meaning of each practice were presented in terms of frequencies and percentage.

Adoption of SWCPs

Adoption is defined as the decision to make full use of a new idea as the best course of action available. It is a sequence

of thoughts and action, which an individual goes through, before he finally adopts a new idea. To assess the level of farmers adoption, they were asked whether they were using the practices of conservation during the previous years or not.

Constraints in the use of SWCPs

Constraints imply forcible restrictions and confinement of action. In this study constraints means impediments in the way of using SWCPs with a view to know the reasons for low/no use of various SWCPs. Five specific problems were prepared based on informal interview with a group of respondents of the study area. These reasons were expressed in percentage for each of the SWCPs.

RESULTS AND DISCUSSION

Usefulness of soil and water conservation practices

About half of the total respondents perceived that the practices like summer deep ploughing, FYM/green manuring, bunding and levelling were useful practices of SWC (Table-1). The data further reveals that more than half of the respondents felt the importance of SWCPs by giving their response as 'useful' or less 'useful' for all practices except two of the practices.

Table 1: Distribution of respondents according to their perception of different soil and water conservation practices (N=160)

SWC Practices	Farmers' responses about extent of usefulness		
	Useful	Less useful	Undecided
Bunding	80 (50.00)	37 (23.12)	43 (26.87)
Mulching	71 (44.37)	18 (11.25)	71 (44.37)
Farm Pond	37 (23.12)	63 (39.37)	60 (37.50)
Summer deep ploughing	88 (55.00)	21 (13.12)	51 (31.87)
Check dam	72 (45.00)	33 (20.62)	55 (34.37)
Leveling	73 (45.62)	18 (11.25)	69 (43.12)
Counter/strip sowing/ planting	24 (15.00)	34 (21.25)	102 (63.75)
Selection of Crop	31 (19.37)	41 (25.62)	88 (55.00)
Small earthen bunds	49 (30.62)	23 (14.37)	78 (48.75)
Live vegetable barriers on boundaries	39 (24.37)	27 (16.87)	94 (58.75)
Drains/trenches	35 (21.87)	46 (28.75)	79 (49.37)
Cover cropping	56 (35.00)	35 (21.87)	69 (43.12)
FYM/Green manuring	75 (46.87)	24 (15.00)	61 (38.12)
Afforestation	45 (28.12)	38 (23.75)	77 (48.12)

Attitude towards different aspects of SWCPs

The percentage of respondents response to the individual statements as presented in Table 2 portrays the intensity (agree, disagree and undecided) of the respondent's attitude towards different aspects of SWCPs. The statements 'SWCP help to increase the moisture in the soil' and 'timeliness of the tillage operation effectively help in conserving soil and water' elicited the most favourable attitude of the farmers as 83.75 and 83.12 per cent farmers were in favour of this statements.

Table 2: Distribution of respondents on their attitude about SWCPs

Statements	Farmers' responses (percentage)		
	Agree	Disagree	Undecided
SWCPs help to increase the moisture in the soil	83.75	04.38	11.87
Sowing across the slope of the field helps in reducing run-off	62.50	05.63	31.87
SWCPs are the long term investment as it did not give immediate effect	68.12	15.63	16.25
Grasses in the waterways reduces the velocity of runoff	58.75	15.63	25.62
Control farming is useful SWCP because it conserves soil & water	21.87	06.88	71.25
Mud boundary bunds is not the beneficial SWCP	30.62	49.37	20.00
Biological soil conservation is beneficial as it maintain soil fertility	43.75	18.13	38.12
Graded bunding is not beneficial SWCP as it hinders agricultural operation	30.62	49.37	20.00
Vegetative bunds are useful for SWC	38.12	26.88	35.00
Broad base furrow is not beneficial SWCP because it does not increase the water table	31.25	20.63	48.12
Use of green manure improves the structure and porosity of the soil that enhance the infiltration of water	38.75	08.13	53.12
Inter cropping the main crop with leguminous crop maintains the soil fertility	55.62	03.76	40.62
Proper crop rotation followed by erosion resistance crop maintain the soil productivity	46.25	05.01	478.74
Surface drainage is beneficial SWCP	11.25	73.12	15.63
because it prevent accumulation of salts on the surface	83.12	08.76	08.12
Timeliness of tillage operation effectively helps in conserving soil and water			

Awareness and adoption of SWCPs

It is revealed from Table 3 that about three-fourth of the respondents were aware about bunding and summer deep ploughing. This may be due to the fact that both the practices were already in use since long time. The findings in respect of adoption revealed that, about three-fourth of the respondents had adopted two practices together namely; summer deep ploughing and bunding. The practices like FYM/green manuring, leaving live vegetative barriers on boundaries and check dams were adopted by 50.00, 48.12, 42.50 and 35.00 per cent of the farmers respectively. Thus it can be said that out of fourteen practices under study, the awareness was found to be medium but the adoption was low except for the traditional practices like summer deep ploughing and bunding. The farmers may not be able to adopt other soil and water conservation practices on their field due to high cost incurred in adoption or unsuitability to their field conditions.

Table 3. Distribution of respondents according to awareness and adoption of SWCPs (N-160)

SWC Practices	Awareness		Adoption	
	Frequency	Percentage	Frequency	Percentage
Bunding	119	74.37	119	74.37
Mulching	89	5.62	41	25.62
Farm Pond	100	62.50	18	11.25
Summer deep ploughing	112	70.00	138	86.25
Check dam	105	65.62	56	35.00
Leveling	94	58.75	77	48.12
Counter/Strip Sowing/planting	58	36.25	06	03.75
Selection of Crop	76	47.50	17	10.62
Small earthen bund	74	46.25	10	06.25
Live vegetable barriers on boundaries	66	41.25	68	42.50
Drains/Trenches	81	50.62	22	13.75
Cover Cropping	91	56.87	33	20.62
FYM/Green manuring	101	63.12	80	50.00
Afforestation	85	53.12	36	22.50

Reason for low/no adoption of various SWCPs

An enquiry was made with the respondents to know the reasons for low/no adoption of the recommended soil and water conservation practices and is presented in Table 4. It is clear from the data present in Table 4, that lack of information / guidance was the constraint for some of the practice like contour strip sowing / planting, live vegetable barriers by more than half of the respondents. Non-availability of inputs/ material/ labour was also considered as major reason for low/no adoption of different SWC practices like summer deep ploughing, afforestation as reported by more than half of the respondents.

Table 4: Distribution of respondents on the basis of reason for low/no adoption of various SWCPs practices (N-160)

SWC Practices	Reasons (farmers' responses in percentage)				
	Lack of information/guidance	Non-availability of inputs/material/labour	Difficulty in cultivation	Lack of skills	Difficulty in maintenance
Bunding	25.62	38.12	10.00	13.12	25.00
Mulching	43.12	21.25	21.87	08.12	30.00
Farm Pond	34.37	43.75	13.12	08.12	23.75
Summer deep ploughing	23.12	55.00	10.00	13.12	13.75
Check dam	35.00	36.87	01.87	11.25	38.12
Leveling	43.12	31.25	03.12	18.12	28.75
Counter/Strip Sowing/planting	26.50	28.12	06.87	10.00	13.75
Selection of Crop	50.00	11.87	08.12	13.12	44.37
Small earthen bund	40.37	21.25	38.12	23.75	05.00
Live vegetable barriers on boundaries	58.75	28.12	31.87	06.25	20.00
Drains/Trenches	50.00	38.12	23.12	05.00	06.87
Cover Cropping	43.12	06.25	11.87	10.00	10.00
FYM/Green manuring	38.12	28.75	31.25	06.25	31.25
Afforestation	50.00	55.00	41.25	10.00	21.25

CONCLUSION

The study revealed that there was a lot of scope to educate and motivate the farmers regarding the direct and indirect benefits of the SWCPs, so that they can adopt them successfully in order to get benefits in terms of stability in yields even under erratic and adverse weather conditions. The government should intensify its effort in implementing such schemes on community basis, which not only provide additional employment to the farmers during off seasons but also benefits the farmers who can afford to implement some of the SWCP on individual basis.

The findings of the study brought out the fact that even though more than half of the farmers perceived the SWCPs to be useful, there is need to convey the scientific rationale behind each of the practices to the farmers, which could be done through the intensification of educational efforts for the officials. Further there is a need to enlighten the farmers regarding the applicability of each of the practices to their respective farming systems so that even under the drought and erratic situations they can reap maximum benefits by adopting suitable SWCPs.

It may be concluded that the low cost and no cost SWCP technologies suitable to small farm holding should be developed for their easy adoption. The technologies should be developed according to the need and feasibility of small and

medium farmers. The ultimate beneficiary farmers should be motivated for their collective participation in adoption of SWCP technologies. The medium level of awareness, low level of adoption with positive attitude about SWCPs under lines the importance of organizing the special training programme and other extension educational activities for the farmers. The input

supply agencies and other development institutions should make suitable arrangement for supply of inputs and materials at proper time to increase the adoption by the farmers. The impact of recommended SWCPs should be shown to the farmers by organizing their visits in a well-established watershed located in other parts of the region and state.

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Information Management System Among Apple Growers

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ABSTRACT

A study undertaken to investigate Information Management System (IMS) revealed that only one third of the farmers cultivating apple had a high level of information management. About 50 per cent of the farmers had a medium level of information management while 20 per cent had a low level of the of information management. The study revealed that sources like input dealers, neighbours and progressive farmers were found to be the most credible sources of information.

Information management system (IMS) plays significant role in every organisation by providing information at various stages of decision making. The success of an organization in achieving its pre-determined goals and objectives depends upon timely and quality information i.e. on its effective IMS. However, the choice and use of information depends upon the credibility as well as competency of the source of information.

In Himachal Pradesh which is known as the 'apple state of India', the area under apple is reported to be 73,700 hectares with total production of three Lakh metric tonnes (Anonymous, 2003). Though the area under apple is on increase yet the productivity (3.53MT/ha) is much less as compared to the national average of 5.8 MT/ha and some of the other apple growing states like Jammu and Kashmir (9.16MT/ha) and Uttar Pradesh (3.8MT/ha). Among the several factors responsible for the low productivity, non-adoption of recommended technology coupled with lack of proper information/knowledge and proper guidance might be one of them, the latter in turn, depends upon how effectively a farmer manages the information obtained from various sources to which he is generally exposed directly or indirectly.

The effectiveness of received message/information increases if the farmer perceives the source to be trust worthy and competent. Keeping this in view, the present study was undertaken with the following specific objectives:

1. To determine the information management system among the respondent apple growers
2. To examine the credibility of selected information sources among the apple growers.
3. To find out the extent of utilization of identified sources as well as the utilization/adooption of the information so obtained by the apple growers.

METHODOLOGY

The study was conducted in purposively selected Shimla district of Himachal Pradesh. Multistage simple random sampling was used. Out of the total fourteen blocks in the district, two blocks viz., Narkanda and Rampur were selected. From each block so selected, five villages were randomly selected and from each selected village, ten apple growers were selected. Thus, a total of 100 respondents constituted the sample for the present study.

The information management system in the context of present study has been measured in terms of 'information input', 'information storage/processing' and 'information output'. Information input was measured in terms of obtaining/seeking information from selected sources of information. 'Information storage/processing' was measured in terms of memorizing (remembering), taking notes in notebook/diary, by keeping printed literature/by keeping/storing pertinent clipping appeared in the newspaper, by the respondents, whereas 'information output' was measured in terms of the utilization of obtained information from the source.

Information Input

For this purpose, twenty experts/scientists having rich experience in the field were selected as judges. The judges were requested to give their scoring out of ten to each source of information used by the apple growers, (which they perceive to be trustworthy) the mean score of the judges on each source of information was calculated. Similar scoring procedure was followed in the storage/processing of information. The judges were asked to give their scoring out of ten to each method of storage of information by the respondents which they perceived to be credible/authentic. Their mean score on each method of storage of information was calculated. The information

output/outcome was operationalised in terms of the degree of utilization of information obtained by the respondents for apple cultivation. It was measured on three point continuum viz. complete utilization, partial utilization and non utilization and accordingly, a score of 3, 2 and 1 was given respectively. All these three types of scores become the base for determining the Information Management System among the apple growers.

Information source credibility

It was operationally defined as the degree to which the apple growers trusted a particular source of information to be accurate and useful for taking information on apple cultivation. It was measured with the help of most-least credibility index method. (Sandhu, 1973) As a first step, the source of information prevailing in the study area were traced out by contacting the apple growers as well as field extension and accordingly divided into three categories namely, institutional mass media and non-institutional source of information. Then the respondents were asked to indicate the most and least credible source used by them in obtaining information about apple cultivation technology. The Relative Credibility Index for each source of information was worked out by using the following formula:

$$\text{Relative Credibility Index (RCI)} = \frac{X}{Y} \times \frac{100}{N}$$

X = No. of respondents who believed the source most credible

Y = No. of respondents who believed the source least credible.

N = Total No. of respondents in the sample.

The relative credibility index of each source of information was worked out and ranks were assigned as per their order of preference.

Formula for categorizations:

The following formula of cumulative frequency cube root method given by sigh (1975) was used:

$$i \times N / 3 - C_{fi} - 1$$

Where:

i = No of categories (i=1,2,3)

Si = Segments (e.g. I, II & III)

Li = Lower limit of the quartile class

C_{fi}-1 = Cumulative frequency of the class preceding to the quartile class

f = frequency of the quartile in the 3/f column

h = Width of the class/interval of the quartile class

N = Total cumulative cube root of frequencies.

RESULTS AND DISCUSSION

Information management system

On the basis of information management score, the respondents were divided into three categories viz. low, medium and high. The study revealed that only one third of the respondents scored high on the information management system, while about 50 per cent of the apple growers had medium information management system & low were slightly more than 20 per cent. Therefore it is implied that sincere and concerted efforts are required on the part of the grass root level extension functionaries of the state Department of Horticulture to improve the management of information system regarding scientific apple cultivation among the respondents. This can be done by organizing short duration training camps on farm/orchard management and maintaining regular contacts with the apple growers.

Credibility of identified information source

The source of information used by the apple growers in the study area were identified and divided into three categories viz. Institutional, mass media and non-institutional. The relative credibility index of the source of information was worked out and the ranks were assigned accordingly (Table I)

Table I: Credibility index of different information source (Category Wise)

Source	Most Trust worthy	Least Trust worthy	Relative Credibility Index	Ranks
1. Institutional Media				
HEO/VED	40	25	1.60	IV
HDO/AIO	33	20	1.65	III
University Scientist	46	28	1.68	II
Agro-input Agency/Dealers	73	27	2.70	I
2. Mass Media				
Radio	86	14	6.14	I
T.V	38	62	0.41	III
Newspaper	26	74	0.35	IV
Agriculture Magazine package of practices/leaflets or bulletins	39	61	0.64	II
Demonstration	11	89	0.12	V
3. Non - Institutional				
Neighbours	62	38	1.83	II
Relatives/friends	41	59	0.69	III
Local Leaders	14	86	0.56	IV
Progressive farmers	68	32	2.12	I
Key communicator	15	85	0.17	V

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A perusal of data in Table 1 revealed that agro-input agency/dealers had the highest credibility among the apple growers. University scientists followed by Horticulture Development Officers (H.D.O./Agriculture Development Officer (A.D.O.) were ranked second and third in credibility, respectively. Horticulture Extension Officers/Village Extension Officers got the fourth rank. The findings seem to be natural as the apple growers generally maintained more contacts with the input dealers and field functionaries like H.D.O./A.D.O. and H.E.O./V.E.O. of State Department of Horticulture and Agriculture. University Scientists provided the apple growers accurate information on apple. Radio was found to be the most credible source among all the other sources of mass media like T.V., Newspaper, Agricultural Magazines/Package of Practices/Leaflet or Bulletin on apple cultivation etc., Television (T.V.) and Newspaper were ranked second, third and fourth in credibility, respectively. However, it was disquieting to note that demonstration was perceived as the least credible source among the other mass media sources of information. Since demonstration is one of the most effective media for dissemination of agricultural innovations to the farmers' fields with its motto of "Seeing is believing". Hence H.D.O./H.E.O. should leave no stone unturned to instill faith in demonstrations among the apple growers by arranging more and more field demonstrations on their apple orchards.

Among the non-institutional sources of information, "Progressive farmers" followed by 'neighbours' were found to be the most credible sources whereas 'relatives/friends', 'local leaders' and 'key communicators' were next in the order of their credibility among the apple growers. These findings were more or less similar to those of Waghdare *et al.* (1998) who reported that Agricultural Assistant/Village Extension Workers followed by neighbours/friends/relatives, progressive farmers/local leaders and radio/T.V./Cinema were the most credible sources of information by the small farmers. Sharma *et al.* (2000) also found that Rural Agriculture Extension Officer (RAEO) followed by friends/neighbours/progressive farmers, radio/T.V. and Agricultural Scientists were the most important sources used by majority of the tribal farmers.

Extent of utilization of information sources

The response of the respondents on the extent of utilization of various identified information source were obtained on the three point continue i.e. "Always, Often and Sometimes" and are presented in Table 2, 3, 4 respectively.

i) Institutional media

Among the institutional sources, agro-input agencies/dealers were used by 43 per cent of respondents; out of which 25 per cent had used them "always". The next preferred sources of information were extension functionaries of State Department of Horticulture i.e. H.E.O.s and H.D.O.s which were used by 29 per cent of the respondents. However, only a meager percentage of the respondents had used them "always" (Table 2).

Table 2: Extent of utilization of Institutional Media (N=100)

Institutional Media	Always	Often	Sometimes
Horticulture Extension Officer (H.E.O.)/ village extension Officer (V.E.O.) (n=15)	04	04	07
Horticulture Development Officer (H.D.O.)/ Agriculture Development Officer (A.D.O.) (n=28)	27	04	10
University Scientists (n=28)	07	10	11
Agro Input Agencies / Dealers (n=43)	25	10	08

ii) Mass Media

Radio was found to be the most popular source of information used by 41 per cent of the respondents. Agricultural magazines, Package of Practices, Apple Bulletin etc. were utilized by 28 per cent of the respondents. However, the percentage of the respondents who had used TV, newspaper and demonstration as a source of obtaining information were more or less the same (Table 3).

Table 3: Extent of utilization of mass media (N=100)

Mass Media	Always	Often	Sometimes
Radio (n=41)	05	25	11
T.V. (n=12)	-	03	09
Newspaper (n=09)	-	-	09
Agriculture Magazine/ Package of practice/ Apple Bulletin etc. (n=28)	20	08	-
Demonstration (n=10)	-	-	10

iii) Non-Institutional Media-

As is evident from the Table 4 that "neighbour" and "progressive farmers" were the most preferred sources used by 38 per cent and 27 per cent of respondents, respectively.

Table 4: Extent of utilization of non-institutional media (N=100)

Non-Institutional Media	Frequency Always	Percentage Often	Sometimes
Neighbour (n=38)	19	06	13
Relative/friend (n=25)	06	08	11
Local Leaders (n=15)	-	08	07
Progressive farmer (n=27)	14	07	06
Key Communicators (Priest, Shopkeeper etc.) (n=5)	-	-	0

However, it was disappointing to note the "Key Communicators" which play an important role in influencing the decision making behaviour of farmers were used only by a few respondents. These findings were in conformity with those of Sonawane *et al.* (2001) who reported that among the personal local sources, majority of the respondents had used friends, neighbours and progressive farmers to seek information on agriculture technology. With regard to personal cosmopolite source, Agricultural Assistant and University Scientist, and among the 'mass media', radio and T.V. were used to get information about agricultural technology.

(d) Utilization/adoption of obtained information

There is no use of taking any information or innovation unless and until it is adopted/utilized by the farmer at his farm/orchard. A perusal of the data depicted in Table 5 has revealed that a majority of the respondents had completely utilized the obtained information pertaining to training/pruning (62%), application of fertilizers (73%), nutritional deficiency (62%), pre-harvest fruit dropping (64%), harvesting (85%), and marketing (90%). More than four fifths of the responders were found to adopt "completely" the information on nutritional deficiency, harvesting and marketing whereas about three-fifth of them had "partially" utilized the information on layout/plantation in apple orchards. However, the respondents who had not utilized the obtained information on lay out plantation, training/pruning, pre-harvest fruit dropping and plant protection were 10 to 15 per cent. These findings were in agreement with those of Bhople *et al.* (1998) who reported that a majority of the farmers had completely adopted the information for orange cultivation. However, an overwhelming majority of them (80%) did not use the information on fruit dropping.

Table 5: Respondents distribution on the basis of utilization of information obtained at different stages of apple cultivation (N=100)

Stages of apple cultivation	Complete utilization	Partial utilization	Non-utilization
a) Layout/Plantation	33	57	10
b) Training/Pruning	62	22	14
c) Fertilizer Application	73	18	09
d) Nutritional deficiency	81	19	-
e) Pre-harvest fruit dropping	64	26	10
f) Plant protection	55	30	15
g) Harvesting	85	15	-
h) Marketing	90	10	-

CONCLUSION

It has been concluded from the study that since the source like input dealers, neighbours, progressive farmers and HDOs/H.EOs were found to be most credible, hence the efforts should be made to equip these sources with the up-to-date knowledge about apple cultivation so that they may discharge their services more efficiently in the process of modernization of horticulture in the state. University scientist and Newspapers provide first hand information on horticulture innovations to the farmers, therefore, it is essential to enhance the contacts of apple growers with these sources. Concerted efforts should also be made to arrange more demonstrations on the farmers' orchards in order to increase their credibility among the farmers towards horticulture technologies/innovations.

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Employment Pattern Among Tribals and Non-tribals

Sujeet K. Jha¹, O.N. Kunzru², S.R.K. Singh³, Sabyasachi Das⁴ and S.K. Jha⁵

ABSTRACT

The study attempted to investigate the relationship between the socio-personal traits of the tribal farmers with different dimensions of employment pattern. The results showed that participation of tribal and non-tribal males as well as females in developmental programmes influenced their overall employment pattern positively and significantly.

In India nearly 8.08 per cent of the population belongs to tribal community having distinct characteristics with respect to their ways of living and culture. Chhotanagpur region of eastern India harbours a large percentage of tribal population. The present study is aimed to find out the relationship between socio-personal traits and employment pattern among the tribals and non-tribal residing in tribal belt of Chhotanagpur region.

METHODOLOGY

This study was carried out in Chhotanagpur region of Eastern India. The respondents were selected from their categories, viz., tribals residing in purely tribal inhabited villages, tribals residing in mixed populated villages and non-tribals from the mixed populated villages.

To study the relationship of those socio-personal traits of the selected respondents with the studied dimensions of employment pattern, viz. Employment Pattern in Agricultural Enterprises (EPAE), Employment Pattern in Animal Husbandry Enterprises (EPAHE), Employment Pattern in Other Enterprises (EPOE) and Overall Employment Pattern (OEP), the respective data were subjected to correlation analysis.

RESULTS AND DISCUSSION

All families pooled together

A perusal of Table 1 reveal that when tribals from tribal villages, tribals from mixed populated villages and non-tribals were pooled, certain variables like education, family size, land, holding, livestock holding, extension contact, attitude, income generation and participation in developmental programmes were positively and highly significantly ($P < 0.01$) correlated with their EPAE. Their attitude towards employment generation was also positively and significantly correlated ($P < 0.05$) with the EPAE. Mass media exposure was, however, found to have a

negative but highly significant ($P < 0.01$) correlation with EPAE probably because, exposure to mass media made them aware of other employment opportunities thus taking them away from agricultural enterprises.

Table 1 : Correlation analysis between independent variables and employment pattern of respondent families.
(N=108)

Independent variables	Employment Pattern Agricultural enterprises	Animal husbandry enterprises	Other Enterprises	Overall
Education	0.27**	0.22**	0.32**	0.30**
Family size	0.24**	0.03	0.34**	0.04
Family Education status	0.08	0.07	0.15**	0.21**
Urban contact	0.11	0.01	0.04	0.12
Land holding	0.42**	0.38**	0.38**	0.39**
Livestock Holding	0.17**	0.48**	0.06**	0.16
Mass media exposure	-0.48**	0.12	0.39**	0.31**
Extension contact	0.43**	0.04	0.27**	0.30**
Attitude towards income generation	0.29	0.12	0.12	0.24*
Attitude towards employment generation	0.13*	0.17**	0.15**	0.18**
Participation in developmental programmes	0.61**	0.06	0.50**	0.24**

* $P < 0.05$, ** $P < 0.01$

Hence it could be interpreted that the respondent families having more family members, larger land holdings and livestock holding, higher extension contact and positive attitude towards income and employment generation were having more opportunities of employment in agricultural enterprises. However, the respondent having more exposure to mass media

were found to be less employed in agricultural enterprises. This could be probably due to that they were weaned away from the time-consuming labour and capital intensive agricultural sector.

It was observed (Table 1) that education, land holding, livestock holding and attitude towards employment generation were correlated positively and highly significantly ($P < 0.01$) with the EPAHE. It is obvious that as the respondent's educational level as well as land and livestock holdings increased and positive attitude towards employment generation developed in them, they had better employment prospects and opportunities in the animal husbandry sector.

Regarding EPOE, it was observed (Table 1) that except three traits namely urban contact, livestock holding and attitude towards income generation all other traits were positively and highly significantly ($P < 0.01$) correlated with the respondents employment pattern in other enterprises.

Table 1 further reveal that education, family education status, land holding, mass media exposure, extension contact, attitude towards income generation, attitude employment generation, and participation in developmental programmes were positively and highly significantly ($P < 0.01$) correlated with the overall employment pattern (OEP) of the respondents. Urban contact was found to be significantly and positively correlated ($P < 0.05$) with the OEP.

Tribal families of tribal villages:

Among the tribal villages land holding as well as livestock holding were found to have positive and highly significant ($P < 0.01$) relationship with their EPAHE (Table 2). Extension contact was also positively and significantly ($P < 0.05$) correlated with their EPAHE. Mass media exposure, education and urban contact were found to have a negative but highly significant ($P < 0.01$) correlation with the EPAHE. The other remaining traits viz. family size, family education status, attitude towards income generation, attitude towards employment generation, and participation in developmental programmes, were positively, but not significantly correlated with the EPAHE. It was further observed (Table 2) that land holding, livestock holding and extension contact were positively and highly significantly correlated ($P < 0.01$) with the EPAHE. Attitude towards employment generation, participation in developmental programmes, family education status and mass media exposure were also found to be positively correlated with EPAHE, but not significantly.

All but three traits were found to be positively and significantly correlated with the EPOE, among tribals of tribal villages (Table 2), of these family size and attitude towards employment generation were found to be significantly and positively correlated ($P < 0.05$) with the EPOE. While, education, urban contact, family education status, mass media exposure, extension contact and participation in developmental programmes were found to be highly significantly and

positively correlated ($P < 0.01$) with EPOE. However, land holding and livestock holding were found to be highly significantly but negatively correlated ($P < 0.01$) with EPOE.

Table 2 also revealed that education, family-size, family education status, land holding and participation in development pattern (OEP). However urban contact was positively and significantly correlated ($P < 0.05$) with the OEP.

Table 2: Correlation between independent variables and employment pattern for tribals respondent families of tribal villages.
(N=80)

Independent variables	Employment pattern Agricultural Enterprises	Animal husbandry enterprises	Other Enterprises	Overall
Education	-0.66**	-0.41**	0.48**	0.64**
Family size	0.10	-0.16	0.27*	0.37**
Family education status	0.04	0.05	0.48**	0.30**
Urban contact	-0.41**	-0.06	0.39**	0.25*
Land Holding	0.59**	0.55**	-0.69**	0.43**
Livestock Holding	0.78**	0.56**	-0.71**	0.14
Mass media exposure	-0.70**	0.12	0.58**	0.14
Extension contact	0.22*	0.38**	0.32**	0.09
Attitude towards income generation	0.11	0.21*	0.11	0.07
Attitude towards employment generation	0.08	0.09	0.21*	0.13
Participation in Developmental Programmes	0.09	0.02	0.40**	0.28**

* $P < 0.05$; ** $P < 0.01$

Tribal families of mixed villages

Among the tribals of mixed populated villages family, education status, land holding, livestock holding and participation in developmental programmes were observed (Table 3) to have positive and highly significant ($P < 0.01$) relationship with their EPAHE; whereas, extension contact as well as attitude towards income generation were found to be positively and significantly ($P < 0.05$) correlated with EPAHE. Mass media exposure was found to have a negative, but highly significant, correlation ($P < 0.01$) with the EPAHE. The remaining traits were positively, but not significantly correlated with EPAHE. A close perusal of the Table 3 reveals that land holding and livestock holding were positively and highly significantly ($P < 0.01$) correlated with the EPAHE. It indicated that as their land size and number of livestock increased, their employment in animal husbandry enterprises also increased.

Table 3 reveal that education, urban contact, family education status, mass media exposure and participation in development programmes were positively and highly significantly ($P < 0.01$) correlated with the EPOE. However land holding as well as livestock holding were having negative, but highly significant ($P < 0.01$) relationship with the respondent's

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employment opportunities in other enterprises. The reason behind this negative relationship could, probably, be that the tribals who had large livestock holding either avoided looking for employment opportunities in enterprises other than agricultural and animal husbandry activities or did not need to look for alternate avenues for employment. Attitude towards employment generation was however, found to be significantly ($p < 0.01$) and positively correlated to EPOE, among triads of mixed populated villages.

In the case of overall employment pattern (OEP), only education and participation in developmental programmes were found to be highly significantly ($p < 0.01$) and positively correlated with it. Family education status, urban contact and land holding were positively and significantly correlated ($P > 0.05$) with OEP.

Table 3: Correlation between independent variables and employment pattern for tribals of mixed villages. (N=80)

Independent variables	Agricultural enterprises	Employment pattern Animal husbandry Enterprises	Overall
Education	0.22*	0.18	0.31**
Family size	0.10	0.11	0.19
Family education status	0.44**	0.02	0.33**
Urban contact	0.05	0.01	0.29**
Land holding	0.61**	0.31**	-0.70**
Livestock holding	0.45**	0.52**	-0.43**
Mass media exposure	-0.39**	0.15	0.34**
Extension contact	0.25*	0.14	0.06
Attitude towards income generation	0.27*	0.10	0.18
Attitude towards employment generation	0.19	0.08	0.23*
Participation in developmental programmes	0.52**	0.10	0.38**

* $P < 0.05$; ** $P < 0.01$

Non-tribal families

As far as non-tribal households were concerned, it was observed (Table 4) that education, family size, family education status, land holding, livestock holding, extension contact, attitude towards income generation, and participation in developmental programmes were positively and highly significantly correlated ($p < 0.01$) with the EPAE. However, urban contact and mass media exposure were found to be negatively, but highly significantly ($p < 0.01$) correlated with EPAE. It is observed (Table 4) that the family size of non-tribals was positively and significantly ($p < 0.05$) correlated with EPAHE. However, land holding, livestock, mass media exposure, extension contact and attitude towards employment generation were positively and highly significantly ($P < 0.01$) correlated with the EPAHE.

Table 4: Correlation between independent variables and employment pattern for non-tribals (N=80)

Independent variables	Agricultural enterprises	Employment pattern Animal husbandry Enterprises	Overall
Education	0.32**	0.27**	0.29**
Family size	0.36**	0.18*	0.27**
Family Education status	0.29**	0.15	0.30**
Urban contact	-0.44**	0.06	0.26**
Land holding	0.30**	0.24**	0.22**
Livestock Holding	0.51**	0.45**	0.37**
Mass media exposure	-0.64**	0.21**	0.50**
Extension contact	0.77**	0.28**	0.37**
Attitude towards income generation	0.75**	0.11	0.50**
Attitude towards employment generation	0.51**	0.40**	0.55**
Participation in developmental programmes	0.85**	0.14	0.77**

* $P < 0.05$; ** $P < 0.01$

All the socio-personal traits, viz. education, family size, family education status, urban contact, mass media exposure, land holding, livestock holding, extension contact, attitude towards income generation, attitude towards employment generation and participation in developmental programmes had positive and high significant ($P < 0.01$) correlation with the EPAHE.

As far as overall employment pattern (OEP) among the non-tribals is concerned, it is observed (Table 4) that all the traits were positively and significantly correlated with the OEP. Education, family education status, mass media exposure, extension contact, attitude towards income generation, attitude towards employment generation and participation in developmental programmes were highly significantly ($P < 0.01$) correlated, while land holding and livestock holding were significantly ($P < 0.05$) correlated.

Male respondents pooled together

When the respondents were classified into two categories on the basis of sex, it was observed (Table 5) that among males, education, urban contact land holding, livestock holding, extension contact, attitude towards income generation, attitude towards employment generation and participation in developmental programmes were positively and highly significantly correlated at 5 per cent level of significance. However, family size as well as mass media exposure were found to have negative and highly significant ($P < 0.01$) correlation with EPAE, probably, because as the family size increased, children were engaged in the agricultural sectors and men sought employment opportunities in other sectors about which they might have become aware through higher exposure to mass media.

It is further observed from Table 5 that among males, land holding, livestock holding and attitude towards employment generation were highly significantly ($P < 0.01$) and positively correlated with the EPAHE. Family education status and urban contact were positively and significantly ($P < 0.05$) correlated with the EPAHE.

Table 5 also reveal that education, family size, family education status, mass media exposure, extension contact and participation in developmental programmes were positively and highly significantly ($p < 0.01$) correlated to EPOE.

As far as overall employment pattern (OEP) of males was concerned, it was observed (Table 5) that education and attitude towards income generation ($P < 0.01$) as well as family education status and participation on development programmes ($P < 0.05$) were positively and significantly correlated with the OEP.

Female respondents pooled together

As is evident from Table 6, among the females, family education status, urban contact, land holding, attitude toward income generation, attitude towards employment generation, and participation in development programmes were positively and highly significantly ($P < 0.01$) correlated with their EPAE. Mass media exposure was found to be highly significantly ($P < 0.01$), but negatively, correlated with the EPAE. Probably, more exposure to mass media prompted the women to move over to other enterprises for employment-purpose.

It was further observed from Table 6 that education, family education status, mass media exposure, urban contact, land holding, livestock holding and attitude toward income generation were positively and highly significantly ($P < 0.01$) correlated with EPAHE. Attitude towards employment generation was having a positive and significant ($p < 0.05$) relationship with EPAHE, among the females.

It was also observed from Table 6 that family education status, urban contact, mass media exposure and participation in developmental programmes were positively and highly significantly ($p < 0.01$) correlated with the females' employment pattern in other enterprises (EPOE). Extension contact was, however, found to be correlated with EPOE, positively and significantly at 5 per cent level of significance. On the other hand, land holding and livestock holding were highly significantly ($P < 0.01$), but negatively, correlated with EPOE.

The overall employment pattern (OEP) of female respondents was found to be positively and highly significantly correlated ($P < 0.01$) with family education status, urban contact, land holding and mass media exposure (Table 6). Their attitude towards income generation was, however, positively correlated with OEP at 5 per cent level of significance.

Table 5: Correlation analysis between independent variables and employment pattern for male respondents of all categories. (N=160)

Independent variables	Agricultural enterprises	Employment pattern Animal husbandry Enterprises	Overall
Education	0.43**	0.28**	0.31**
Family size	-0.36**	0.01	0.32**
Family education status	0.18*	0.18*	0.21**
Urban contact	0.20**	0.18*	0.10
Land -Holding	0.35**	0.24**	0.05
Livestock-Holding	0.35**	0.42**	0.11
Mass media exposure	-0.41**	0.11	0.34**
Extension contact	0.39**	0.06	0.39**
Attitude towards Income Generation	0.21**	0.10	0.14
Attitude towards Employment Generation	0.10	0.20**	0.16*
Participation in Development programmes	0.55**	0.04	0.46**

* $P < 0.05$; ** $P < 0.01$

Useful implications emanated from the study

1. As the number of members in a family increased, it led to an increased employment in agricultural enterprises.
2. Size of land holding contributed positively and significantly in generation of employment opportunities and animal husbandry sectors, for both male and female tribals as well as non-tribals.
3. Exposure to mass media had a negative but significant influence on the employment pattern in agricultural enterprises among all tribals and non-tribals.
4. Among the tribal and non-tribal females, land holding and livestock holding had a negative but significant relationship with their employment pattern in other enterprises.
5. Family -size had a negative, but highly significant relationship with employment of tribals and non-tribal males, in the agriculture sector; but a positive and significant relationship with their employment in other enterprises.
6. Among non-tribals, favourable attitudes towards income and employment generation contributed significantly and positively in getting them employment in agricultural enterprises.
7. Participation of tribal and non-tribal males as well as females in development programmes influenced their overall employment pattern positively and significantly.

Table 6: Correlation analysis between independent variables and employment pattern for female respondents of all categories (N=160)

Independent variables	Agricultural enterprises	Employment pattern Animal husbandry Other enterprises	Overall Enterprises
Education	0.12	0.22**	0.10
Family size	0.12	0.07	0.11
Family education status	0.24**	0.20**	0.31**
Urban contact	0.28**	0.20**	0.30**
Land holding	0.42**	0.24**	-0.59**
Livestock holding	-0.02	0.32**	-0.31**
Mass media exposure	-0.28**	0.54**	0.61**
Extension contact	0.01	0.37**	0.16*
Attitude towards Employment Generation	0.24**	0.07	0.11
Attitude towards Income Generation	0.27**	0.26**	0.10
Participation in Development programmes	0.57**	0.07	0.49**

P<0.05; **P<0.01

CONCLUSION

It is evident from the results of the present study, there are a lot of opportunities in employment generation in agriculture and animal husbandry sectors among those tribal families having large land holdings. A careful observation of the study suggests that large tribal families must shift from agriculture to other allied sectors, such as animal husbandry which is the key to any development programmes, must be utilized in creating awareness and favourable attitude towards income and employment generation among the tribals.

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Canal Irrigation Command and Non Command Area of Orissa: A Comparative Situational Analysis

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ABSTRACT

A comparative analysis of canal command and non-command area of Orissa revealed that most of the farmers had a unfavourable attitude towards usefulness of canal irrigation. Alarming gap was found between the potential created and potential utilised in the command area. Farmers also listed a number of constraints in canal irrigation.

An important factor in rural change is perception. The way people interpret the technology to which they are exposed by and large determines its acceptance and adoption (Muthaya, 1986). Perceptions and opinions of the farmers are influenced by their socio-economic background (Rogers, 1983). The adoption and decision making behaviour of farmers depend upon their socio-economic situation. Farmers weigh socio-cultural considerations besides agronomic, economic criteria and attributes of technology to arrive at their own conclusions about the suitability and adoption of any technology in specific farming system (Singh, 1995). Social perspective of irrigation is for comprehensive understanding and management of irrigation system as irrigation technologies not only mediate people's relationship with bio-physical process, but also shape the people - people relationship (Molling, 1998).

In this context, a study was conducted both in canal command and non-command area of Orissa with the objectives to explore differential cropping pattern, socio-economic profile, and attitude of the farmers of canal command and non-command areas.

METHODOLOGY

The study was carried out in command area of Nimapara Branch Canal under Puri Main Canal of Mahanadi Delta Irrigation project in the State of Orissa, India. Command area of three minors, viz. Saripur, Gringo and Garedipanchan of the canal at Balipatna block of Khurda district was selected by following random sampling method. The command area largely consists of small farmers with average holding size of one ha or less. Rice-fallow is the predominant cropping system in areas outside the irrigation command while rice-rice is most commonly followed cropping system in the command area.

The sampling procedure adopted for the selection of respondents was stratified random sampling. The Nimapara branch canal command area of Balipatna block was divided into

three strata according to the areas under three minors, namely Saripur, Gringo and Garedipanchan. A total of 100 farmers representing from head, middle and tail reaches of command area were selected as respondents from the above mentioned three strata following random sampling method. Simultaneously, two blocks viz. Jatni and Khurda of the same district were selected as non command area. A total of 50 farmers were selected from two villages of each block as respondents following random sampling method. The socio-economic profile, attitude and cropping pattern were studied with the help of an interview schedule developed for this study. The respondents were further classified under each variable with help of pooled mean and pooled standard deviation.

RESULTS AND DISCUSSION

Socio-economic profile

A perusal of the data in Table 1 indicates that the largest percentage of farmers belonged to the middle age category in both canal command and non-command area. It clearly confirmed the paradigm shift with respect to preference of occupation of the village youth other than the cultivation. It was observed that majority of the respondents was having education either up to primary level (30%) or secondary level (28%) in command area, while twenty and thirty-four per cent of the respondents were illiterate and functional literate, respectively, in the non-command area. Evidently, seventy and eighty per cent of the respondents were mainly engaged in cultivation in command and non-command area, respectively. Rest of them took cultivation as supporting or subsidiary occupation. Social participation was found to be poor, as majority of the farmers had no social participation.

A glance at the data given in the Table 1 reveals that majority of the farmers had medium land holding (2.2 to 5.0 acres) in both canal command and non-command area. More than eighty per cent of the farmers in command area and sixty

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per cent of farmers of non-command area had medium assets holding (6 to 21) in term of tools and implements. Only fifteen percent of them had relatively high holding of tools and implements. It is interesting to note that majority of the farmers were having only low (≤ 2) to medium (3-7) livestock holding. Domination of poor livestock holding shows farmers' preference of crop farming. They do not consider dairying as worth investing venture. The monthly income of the farmers was found to be very low as most of them had an income not more than Rs. 2000 per month.

The use of communication sources by the farmers in terms of personal localite, personal cosmopolite and mass media was studied. Personal localite sources included neighbours, fellow farmers, village leaders, etc. Personal cosmopolite involved Agricultural Development Officers, Agricultural Extension Officers, Village level Workers, etc. Mass media sources included radio, television, and newspaper. It could be noted from the Table 1 that the farmers in non-command area were low to medium user of communication sources, however, thirty-two percent of them in command area were high users of communication sources. Findings also led to infer that farmers preferred eminent sources of information more frequently as compared to external sources.

Table 1: Socio-economic profile of the farmers of canal command and non command area

Variables	Frequency of farmers of the canal command and non-command area			
	Command Area (N=100)	Non command Area (N=50)	Pooled Mean	Pooled Range SD
Age (in Years)	12.33	30-86	55.44	
Young (<43)	14	5		
Middle (43-67)	70	35		
Old (>67)	16	10		
Education				
Illiterate	6	10		
Functional Literate	14	17		
Primary	30	10		
Secondary	28	11		
Higher education	22	2		
Occupation				
Wage Labour	-	3		
Cultivation	70	40		
Salary group	27	6		
Self employment	-	1		
Totals	3	-		
Occupation of Cultivation				
As main	70	40		
As subsidiary	30	10		
Social participation			3.63	1.76 0-8
participations	48	25		
Low (<3.63)	23	8		
High (>3.63)	29	7		
Land Holding (in acres)			3.60	1.40 0.25-20

Small (<2.2)	34	10			
Medium (2.2-5.0)	53	27			
High (>5.0)	13	13			
Assets (Tools & implements) holding			13.25	7.87	2-34
Low (<6)	7	5			
Medium (6-21)	86	30			
High (>21)	7	15			
Livestock holding			4.30	2.3	0-18
Low (<2)	22	17			
Medium (3-7)	67	21			
High (>7)	11	12			
Monthly Income in Rs.					
Less than 1000	47	10			
1000-2000	24	16			
2000-3000	11	5			
3000-4000	8	14			
More than 4000	10	5			
Use of communication sources			9.47	4.98	1-30
Low (<4.49)	6	23			
Medium (4.49-14.45)	62	27			
High (>14.45)	32	-			
Attitude towards the usefulness of canal irrigation in cultivation			26.33	4.02	14-32
Command area			23.55	2.09	20-30
Non command area					
Favorable	56	35			
Unfavorable	44	15			

Attitude analyses

According to this study, fifty-six per cent of the respondents were having favourable attitude towards the usefulness of canal irrigation in cultivation. But an alarming forty-four per cent of the farmers of non-command area showed unfavourable attitude towards it. In contrast, seventy per cent of the farmers of non command area expressed the needs of canal irrigation. The favourable attitude may be attributed to many reasons like availability of adequate canal water, suitability of vegetable cultivation in dry season, benefits of irrigation in terms of yield and income, etc. On the other hand, unfavourable attitude may be due to faulty alignments of canals and outlet resulting into water scarcity during critical period and flood water logging during rainy season, poor maintenance of canal distribution system, lack of monitoring the officials, etc. It is also to be mentioned here that the attitude of the farmers varied with their land situation at upper, medium and tail end of the minors.

It is evident from Table 2 that about ninety per cent of total cultivated area was under cultivation during wet season while only forty five per cent area being cultivated in dry season. It is an unhealthy sign in the canal command area that more than fifty per cent of the area was being uncultivated inside the command, this has been resulted into the existence of more cropping i.e. only rice in the wet season fallow or rice in most area where canal water was available during dry season.

Table 2: Land holding and cultivated area under canal irrigation command

Particulars	Means area (acres)	
	Wet season	Dry Season
a) Area owned	4.35	
b) Area leased in	0.11	
c) Area leased out	0.31	
d) Total cultivable area (a+b+c)	4.15	3.27 (89.63) 1.88 (45.30)
e) Cultivated area inside the canal command		3.01 (72.53) 1.69 (40.72)
f) Uncultivated area inside the canal command		0.43 (10.37) 2.27 (54.70)
g) Cultivated area outside the canal command		0.71 (17.10) 0.19 (4.58)

*Figures in parentheses indicate the percentage of total cultivable area.

Further probing in to the existing scenario of having enormous gap between potential created and utilised in the irrigation command delineated several factors as perceived by the farmers. More than seventy per cent of the farmers of command area have perceived reason of not getting adequate water as canal distribution system is not well maintained and faulty alignment of distribution system and untimely repair of distribution system (Table 3). Most of the farmers used to keep the land fallow in dry season and cultivate only in wet season, few of them used to give light irrigation to side over the critical period and switch over to low duty crops (Table 4). Farmers use to represent to the irrigation officials and wait for them to visit the area for taking necessary action to provide irrigation. Farmers perceived constraints in term of lack of fund and interest on part of the irrigation department to improve upon the existing situation (Table 5 and Table 6).

Table 3: Reasons of not getting adequate water as perceived by the farmers

Reasons as perceived by the farmers	Frequency (%)
There is less water in the reservoir	10 (25.00)
Canal/distribution system is not well maintained	31 (77.50)
Faulty alignment of distribution system	29 (72.50)
Untimely repair of distribution system	28 (70.00)
No monitoring of water supply	24 (60.00)

Table 4: Farmers' alternative measures to overcome unavailability of canal irrigation water

Alternative measure to overcome unavailability of water	Frequency (%)
Supplementary irrigation from other source	13 (32.50)
Giving light irrigation to ride over other the critical period	17 (42.50)
Grow early variety crops	12 (30.00)
Switching to low duty crops	16 (40.00)
Keeping the land fallow (Growing no crop) in dry season & cultivating only in wet season mainly depending on rain water	25 (62.50)

Table 5: Action taken by farmers in case of getting insufficient water through canal irrigation

Action taken by farmers	Frequency (%)
Represent to the officials irrigation department	32 (80.00)
Wait for the official to visit the areas	34 (85.00)
Forcibly take water when it is available	08 (20.00)
Irrigate field on turn basis	14 (35.00)
Irrigate the fields from other source	13 (32.50)

Table 6: Farmers' perceived constraints related to irrigation department.

Constraints related to irrigation department	Frequency (%)
Lack of interest on part of the officials	30 (75.00)
Geographical constraints (Land situation, etc)	22 (55.00)
Lack of community co-operation	26 (65.00)
Financial constraints	33 (82.00)

Existing cropping pattern

It was found that Rice-Rice is the cropping sequence in 95 per cent of the command area if water is released during dry season. The cropping intensity is 180 per cent. If the water is not released during dry season then, the cropping intensity will be 120 per cent with Rice-Black gram, Rice-Green gram and Rice-horse gram sequence under residual moisture. Rice-fallow was found to be predominant in the non-command area. The rice varieties mostly grown during the wet season are CR-1017, CR-1009, Swarna, Padmini, Moti, Tulasi, CR-1014, IR-1242 and Lalat. In dry season ninety per cent of the farmers use to rice variety Samalei in command area.

The study revealed that more than seventy per cent of farmers of the both areas cultivated 1 to 6 acres of land in wet season. The mean cultivated area in command and non-command areas were 2.9 and 5.3 acres, respectively. The average nitrogen use in wet season (57 Kg/ha) is lower than the dry season (71 Kg/ha) in command area. The average use of phosphorus is 23 Kg/ha and 33 Kg/ha in wet season and dry season, respectively. The average application of potash in wet season and dry season is 49 Kg/ha and 61 Kg/ha, respectively. In contrast, average application of N, P, and K in non-command area was found to be 26, 10 and 16 Kg/ha, respectively.

The average yield of paddy in the command is 2.1 and 2.92 t/ha in wet season and dry season, respectively. The yield in 1.13-5.0 t/ha in wet season and 1.31-5.0 t/ha in dry season. The yield in the non-command area was found to be 1.96 t/ha in wet season. Low input use, absence of field channel and uncontrolled irrigation, late transplanting in wet season and contributed to the low average yield in canal command as well as non-command area. About fifty per cent and seventy-five per cent of the farmers of command and non-command area, respectively, used to go for nursery sowing during the second fortnight of June to first fortnight of July because of lack of

water sources for raising nursery. In dry season most of the farmers of command area compelled to delay nursery sowing to first fortnight of January, because of which, the crop used to undergo water stress in the later stage. Harvesting time varies from first fortnight of December to first fortnight of January in wet season and fortnight of April to second fortnight of May in dry season.

CONCLUSION

Socio-economic profile is of paramount importance as it regulates the decision making and adoption behaviour of farmers. Poor participation of farmers in the social organization and simultaneously average exposure to different communication source definitely warrant their organizations in the study area to be active and stimulate the farmers in awakening their mental horizons. The study areas need to be hooked up with different sources of communication, especially

the mass media. The unfavourable attitude of the farmers towards usefulness of canal irrigation in cultivation is an unhealthy sign. There is an alarming gap in between the potential created and potential utilised in command area resulting into no striking differences between the scenario and perception of the farmers of command and non-command areas. Delayed planting, low input use and uncontrolled irrigation are the main reasons for the low productivity and crops other than paddy could be tried to increase the water use efficiency. Possibility of third crop can be explored by altering the cropping system. Hence, this is high time to persuade farmers to learn more and more towards crop diversification and judicious use of water following proper methods and schedules of irrigation and other scientific water management practices. Farmers perceived several constraints with respect to canal irrigation, which need to be taken care of to improve upon the existing situation.

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Impact of Information Technologies on Empowerment of Milk Producers

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ABSTRACT

The present paper describes the impact of the programme on introducing the computerisation of milk co-operatives launched on March 2000 in the Rajasthan state of India. Jaipur dairy, which covered Jaipur and Dausa districts and had largest computerization, was also purposively selected. Five computerized dairy co-operative societies were randomly selected amounting to a total of 25 computerized DCSs for the study. The study revealed that there was considerable improvement on delivery of information related to past history of milk sale, milk production, training of individual and history of cattle owned after computerization. The indicator related to role of IT in providing innovative information and bridging the gap between information rich and poor scored a higher value. After introduction of IT, milk union provided the loan with in a week to farmers for purchasing animal, which was found to have significant bearing on empowerment of milk producers because they felt they were getting a service rather than a favour.

With the Amul model of dairy development, India became world's largest milk producer, while telecom revolution enhanced the connectivity and also led to employment of millions of people. The basic concept of co-operatives and telecom expansion boils down to accessibility and affordability. While empowerment of rural masses gave way to milk revolution, strengthening of local bases and building of indigenous models made it possible for us to achieve high tele-density. Information Technology (IT) has opened new avenues in the rural development domain of India. IT helps in providing improved services to rural population and empowers them through access to information as well as in generation, acquisition and dissemination of knowledge. Keeping the above point in mind, the present study aims to measure the impact of Information Technology on empowerment of the milk producers in dairy cooperative society.

METHODOLOGY

The present study was conducted in the purposively selected Rajasthan State. Jaipur dairy, which covered Jaipur and Dausa districts and had largest computerization, was purposively selected. A list of computerized DCSs functioning under each chilling center was prepared out of which five computerized DCSs were randomly selected. Thus, a total of 25 computerized DCSs were selected. Further five per cent of total member from each DCSs was randomly selected. Thus, total

180 milk producers were selected for the present study. The data were collected and analyzed to study the empowerment of milk producers before and after introduction of IT in dairy cooperative societies. The main indicators selected for this study to measure impact of IT on empowerment were access to information, improved decision-making, better access and operation of formal credit system, and timely availability of information through training programme. The 'X' test was applied to know whether empowerment of milk producers and introduction of information technology were independent or not.

RESULTS AND DISCUSSION

Access to information

Use of IT enabled milk producers to connect to information effectively, cut down transaction costs and bring in transparency and accountability. The respondents had quick access to information related to various extension programmes like livestock field day, Kisan Gosthi, and Kisan Mela as the required information were provided with the payment slip itself. Before introduction of IT in dairy cooperatives there was no mechanism for quick dissemination of such information to milk producers. Before introduction of IT, information on extension programmes and veterinary camps was passed on

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verbally which resulted mostly in loss of information and poor attendance in such programmes. Introduction of IT enabled quick and timely dissemination of information through payment slip, which was found to have significant bearing on empowerment of milk producers (Table 1). The database created using IT at dairy cooperatives provided detailed history on milk production by farmers. Besides, data on feeding, breeding, management and healthcare also provided up-to-date information about each farmer's milk cattle and service delivery that were collected interactively during the farmer's daily visit to the society. Before introduction of IT it was not possible to enter these kinds of data because of the manual book-keeping in the DCSs.

Table 1: Access to information (N=180)

Indicators	Before IT		After IT		χ^2 Agree Value		
	Disagree (%)	Undecided (%)	Disagree (%)	Undecided (%)			
Provision of information with payment slip regarding							
Live stock field day	66.67	28.44	3.89	25.56	5.90	69.44	166.69*
Kisan goths	73.33	2.78	3.89	23.89	8.33	67.78	159.85*
Kisan mita	65.56	24.33	6.67	6.11	15.56	78.33	205.24*
Provision of information about							
Feeding	65.56	30.55	3.89	35.00	8.33	56.67	122.36*
Breeding	57.78	32.78	9.44	39.44	6.67	53.89	93.47*
Management	56.67	36.66	6.67	27.22	10.56	62.22	125.24*
Health care	58.89	32.78	8.33	26	12.78	60.55	108.91*
Provision of data to farmers on the seasonal variation in milk production	61.66	32.78	5.56	14.44	8.89	76.67	188.09*
Provision of immediate information about							
Past history of milk sale	64.44	30.00	5.56	6.67	6.67	84.44	229.59*
Milk production	69.45	24.44	6.11	11.67	18.89	81.66	209.43*
Training of individual	66.67	23.89	9.44	15.00	10.89	66.11	136.39*
Number of cattle	56.11	32.78	11.11	16.67	10.55	72.78	140.58*
Credibility of information obtained from website	86.67	7.22	6.11	23.89	5.56	70.55	102.66*
Overall	65.30	25.51	6.67	20.94	9.74	69.31	157.60*

*Significant at 1 percent level.

The present study revealed that there was considerable improvement on delivery of information related to past history of milk sale, milk production, training of individual and history of cattle owned after computerization. The basic details of breed and history of inoculation, artificial insemination, and pregnancy were maintained in the system. The information obtained from website was treated as highly credible by milk producers. Thus, all dimensions of access to information were found highly associated with empowerment as revealed by the Chi square value in the Table 1.

Facilitating improved decision making

Data presented in the Table 2 revealed a significant increase in number of respondents covered under participatory decision making after the introduction of IT in DCSs. Although, all the indicators related to improved decision making were found significant at 1 percent level of probability the indicator related to role of IT in proving innovative information and bridging the gap between information rich and poor scored a higher χ^2 value. This was followed by indicators related to accurate and honest payment, better data storing and maintaining of milk collection records and cattle insurance and loan respectively (Table 2). An effort to sustain participation usually requires changing the rules in order to change people and bridge the gap between information rich and poor. So the present finding can be considered as a good indication in sustaining peoples' participation in IT based DCSs. The participatory decisions focus on improving planning and monitoring of development programmes. Participatory decision-making was not always harmonious and priorities may be contested, so conflict resolution mechanisms need to be in place to manage disagreements. Before introduction of IT the decision about organization of training programmes, supply of inputs, fodder and seed supply, cattle insurance and loan were taken by the chilling center manager.

Table 2: Facilitating improved decision making (n=180)

Indicators	Before IT			After IT			χ^2 Value
	Disagree (%)	Undecided (%)	Agree (%)	Disagree (%)	Undecided (%)	Agree (%)	
Participatory decision about conducting training programme	68.89	25.55	5.56	22.78	6.67	70.55	161.79*
Participatory decision to supply inputs, fodder seeds for improvement of DCSs farmer	78.89	12.78	12.78	31.11	6.67	72.22	154.79*
Accurate decision about better data storing and maintaining of milk collection records	66.56	34.44	5.00	11.67	12.78	75.55	188.89*
Participatory decision about dispensing cattle insurance and	58.33	37.78	3.89	23.33	9.45	67.22	159.17*
Computer based new information service to change people and bridge the gap between information rich and poor	87.78	7.22	5.00	11.11	5.45	82.33	232.42*
Enter correct an honest payment	70.55	23.89	5.56	30.00	7.78	82.22	217.22*
	70.83	23.61	5.56	36.66	8.15	75.18	185.64*

*Significant at 1 percent level.

The data in Table 2 also depicted that milk producers were endured of correct and accurate payments because of computerization, which enabled to calculate the profits and loss of the society with in moments on the basis of the data on previous day's collection. Before introduction of IT milk producers were paid after every ten days only and reliability of the manual calculations of quality and quantity by dairy cooperative society staff were at stake. Computer based new information changed people and social order to control

organization at the society level, introduced sound management and strong accounting systems and provided effective and profitable services to milk producers. After introduction of IT the rich and poor members were included in the decision making process, which helped to build commitment and change unfavourable rules against milk producers. The above indicators of facilitation improved decision-making were found highly associated with empowerment as revealed by the Chi square value in the Table 2.

Participation of poor people in decision-making was critical to build on local knowledge and priorities, and to build commitment to change. However, an effort to sustain inclusion and informal participation usually required changing the rules so as to create space for people to participate directly or indirectly in local delivery of basic services (Michele et al., 2000).

Formal credit system

A glance at the Table 3 reveal that there was considerable improvement on provision of daily payment and loan in minimum time to purchase the animals. The milk products were now getting the total value of the milk on printed payment slip, which was usually collected from the adjoining window. Before introduction of IT, conventional Gerber method used to take 2-3 hours to calculate fat content that was much more cumbersome, and payment to milk producers was made every ten days due to the inability of the collection centers to calculate the payment immediately. Before introduction of IT milk producers travelled long distances to reach district head quarters in order to submit applications for getting loan to purchase animals. This involved the loss of a day's income discomfort harassment and corruption and the whole procedure usually took a period of 2-3 months. After introduction of IT milk union provided the loan with in a week to farmers for purchasing animals which was found to have significant bearing on empowerment of milk producers because they felt they were getting a service rather than a favour (Table 3).

Table 3: Formal credit system (N=180)

Indicators	Before IT			After IT			χ^2 Value
	Disagree	Undecided	Agree (%)	Disagree	Undecided	Agree (%)	
Provision of daily payment on the basis of record of sold milk	84.44	8.89	6.67	11.11	7.78	81.11	215.98*
Loan for purchasing animals in minimum time	80.00	28.33	6.67	12.78	21.67	65.55	151.14*
Accurate recording of credits and their distribution in the society	71.11	23.33	5.56	30.56	6.11	67.33	134.48*
Smart card with various information and detailed records about individual milk producer to verify transparency and security about milk collection	85.00	6.11	8.89	8	7.78	83.89	222.85*
Holding the smart card members first empowerment	18.89	4.44	6.67	8.89	12.22	78.89	234.08*
Knowledge of computer operation used to employment of	85.89	7.78	7.22	6.67	6.11	87.22	242.63*
	76.91	13.15	6.95	13.00	10.28	76.56	200.08*

The result presented in Table 3 indicate that computerization and resultant smart cards and information through Internet helped to maintain loan tracking financial projections and information management of individual milk producers which reduced cost of operation and increased efficiency. Smart cards had embedded microchip containing information on milk producers' account of financial transaction costs. Before introduction of IT, records in chilling centers as well as in milk union were maintained manually and individual financial information was not provided to milk producers. Thus all dimension of formal credit system were found highly associated with empowerment as revealed by the chi square values in Table 3.

Training programme

In order to use sophisticated information technology application in dairy cooperative societies, milk producers needed specialized training. Before introduction of IT, training on computer handling, clean milk production and milk testing was provided 1-2 times in a year only to secretaries of the DCSs at milk union which resulted into poor learning of these practice and non-adoption by the DCSs. The respondents were getting training 2-3 times in a month related to computer operation, milk testing and clean milk production which increased the confidence among members, brought awareness and enhanced production and productivity. These training programmes were found to have significant bearing on empowerment of milk producers (Table 4).

The training programme organized using IT helped to change skills, knowledge and attitude of milk producers that was observed as another important aspect of successful use of IT in DCSs. It can be also seen from the Table 4 that the training about improved dairy farming practice like feeding breeding, management and health care were provided 5-6 times in the year to all milk producers of DCSs. Before introduction of IT these trainings were provided only to those milk producers who were interested to attend the training. The data in Table 4 further revealed that this increased role of training had a significant association with empowerment of milk producers. In the present study it was observed that training using video film, LCD projection and audio-visual equipments helped to make it interactive and more effective.

Thus, the above indicators of training programs were found highly associated with empowerment as revealed by the chi square value in the Table 4.

Table 4: Training programme (N=180)

Indicators	Before IT			After IT			χ^2 Value
	Disagree	Undecided	Agree (%)	Disagree	Undecided	Agree (%)	
Training on computer handling	86.66	7.78	5.56	19.44	26.11	54.47	166.21*
Animal health and sanitation training	72.22	18.33	9.45	15.45	17.00	69.44	149.59*
Clean milk production	81.67	13.33	19.45	17.78	7.78	79.44	134.55*
Feeding, breeding and management training	61.00	28.33	10.90	10.00	28.89	61.11	127.35*
Proper storage of milk	61.11	22.78	12.22	13.33	27.78	58.89	117.56*
Milk testing training	68.89	7	6.11	12.78	5.56	81.65	117.96*
	20.55	10.46	10.46	10.52	67.49	75.64	

CONCLUSION

It was observed that indicators of access to information like provision of prompt information about past history of milk sale, milk production and training of individual, provision of data to farmers on seasonal variation and credibility of information obtained from web site had a significant association with empowerment of milk producers. The Chi square value of facilitating improved decision making indicated that computer based new information served to change people and bridge the gap between rich and poor, ensure correct and honest payment, better data storing and maintaining of milk collection records

and conducting training programme, dispersing cattle insurance and loan and participatory decision regarding supply of inputs for dairy farmers had a significant association with their empowerment. IT had a great contribution in empowerment of respondents as it was found that even holding a smart card they felt empowered and it also provided transparency and security regarding milk collection. Knowledge of computer operation led to higher level of empowerment. Timely and prompt availability of daily payment and loans were also found highly associated with empowerment of milk producers.

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Testing of Multimedia Kit on Cultivation of Crops and Subsidiary Occupations

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ABSTRACT

The study aimed at testing of multimedia kit consisting of booklets, charts, flip-charts and CDs in relation to their effectiveness in dissemination of farm technologies. The results of the investigation showed that farmers perceived the kit as appropriate resulting in significant gain in knowledge of various farm technologies.

Mass media is very important as far as the transfer of agricultural technology is concerned. Its role becomes important for communication and training purposes. India is mainly agriculture based country. To increase farm productivity it is essential to update the knowledge of farmers through better training and educational system. This can only be possible by using proper and appropriate media or methods.

This study was planned as a part of NATP research project entitled "Developing and Testing of Multimedia Integrated system of Education for Young Farmers of Punjab in High Tech. Agriculture". After developing the multimedia kit it is very necessary to test the different components/ aspects of media kit (booklets, charts, flip book, audio cassettes and video compact disc). Thus a study on "Testing of Multimedia Kit relating to cultivation of crops and subsidiary occupation" was conducted with the objective to test the multimedia kit developed for the Personal Contact Programmes (PCPs)/training of farmers.

METHODOLOGY

The study was conducted in the four purposively selected districts of Punjab where KVKs are established namely Kapurthala, Nawanshahar, Patiala and Ferozpur. From each selected district, three blocks were also purposively selected as per discussion with the scientists of KVKs. From each block one village was selected with the consultation of scientists of KVKs. From each village 20 young farmers were selected randomly. In this way 240 young farmers were selected from the twelve villages of four districts as the respondents of this study.

The multimedia kit was tested by taking the opinion of the young farmers about its different aspects characteristics whether they are appealing/ somewhat appealing, appropriate/ somewhat appropriate, attractive and suitable/ somewhat attractive and suitable, understandable easily/ somewhat

understandable, sequence wise/ some what sequence wise and applicable somewhat/ applicable.

The multimedia kit was also tested by studying the gain in knowledge of young farmers with the help of knowledge test about cultivation of different crops, subsidiary occupations and soil and water testing procedure. The pre test knowledge level of young farmers was studied before using the multimedia kit, during the Personal Contact Programmes (PCPs) and knowledge level was again studied after using the multimedia kit during the PCPs/ training. The gain in knowledge was measured on the basis of pre and post knowledge test scores. The knowledge test comprised of various items concerning different cultivation practices of different crops (Wheat, Rice, Cotton, Sugarcane and Maize) and also the items pertaining to subsidiary occupations (Dairy Farming, Poultry Farming, Mushroom Cultivation and Bee Keeping) and soil and Water Testing procedure on the basis of recommended practices of Punjab Agricultural University, Ludhiana. The test was administered to the young farmers and the responses were quantified by giving a score of one to the correct answer and zero to incorrect answer. In this way, the total scores of a respondent were calculated on the basis of correct/incorrect answers about all the items. The total scores of each aspect of the crop cultivation, subsidiary occupation and soil and water testing, were calculated. The score for each aspect of a respondent was calculated by adding the scores of all the items. Thus, the mean score for each respondent for each aspect containing various items were calculated dividing the total number of items under each aspect of different crops, subsidiary occupations and soil and water testing procedure. In this way, the total mean scores of each aspect of all the respondents were calculated accordingly.

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RESULTS AND DISCUSSION

Socio-personal Characteristics:-

Age :

The data in Table 1 reveal that majority of the respondents (57.50 %) were in the 25-32 age group, 27.92 per cent were in 18-25 age group and 14.58 per cent of the respondents were in 32-39 years of age group category.

Table 1: Distribution of the respondents according to their socio-personal characteristics (N=240)

Characteristics	Categories	Frequency (f)	Percentage (%)
Age (Years)	18-25	67	27.92
	25-32	138	57.50
	32-39	35	14.58
	40-49	9	3.75
Education	Primary	39	16.25
	Middle	62	25.83
	Matriculate	95	39.58
	Senior Secondary	29	12.08
	Graduate	15	6.25
Operational Land Holding (in acres)	Upto 14	162	67.50
	14-28	57	23.75
	28-42	21	8.75
Farming Experience (in years)	2-8	136	56.66
	8-14	76	31.67
	14-20	28	11.67
	20-25	10	4.17
Extension Contacts	Always	22	9.17
	Sometimes	87	36.25
	Never	131	54.58

Education :

It is clear from the data in Table 1 that educational level of the respondents ranged from primary to graduation. It was found that 16.25 per cent of respondents had up to primary level of education, 25.83 per cent had middle level school education, 39.58 per cent had matriculation 12.08 per cent had senior secondary educational level and 6.25 per cent of the respondents were graduates.

Operational land holding :

Study findings revealed that maximum operational land holding of the respondents were upto 42 acres. Majority of the respondents (67.50%) had upto 14 acres of operational land holding, whereas 23.75 per cent respondents had 14-28 acres of land under different crops. Only 8.75 per cent of respondents had 28-42 acres of operational land holding.

Farming experience :

The data in Table 1 reveal that farming experience of the respondents varied from 2-20 years. Majority of the respondents (56.66%) had farming experience of 2-8 years, while 31.67 per cent respondents had 8-14 years of farming experience and 11.67 per cent of the respondents were found to have 14-20 years of farming experience.

Extension contacts:

Data in Table 1 revealed that 54.58 per cent of the respondents had no contacts with the extension workers. Only 9.17 per cent of respondents used to contact the extension workers always and 36.25 per cent of young farmers had contacted the extension workers sometimes for seeking information of advice regarding the agricultural and subsidiary occupations.

Table 2: Distribution of the respondents' opinion regarding of multimedia kit

Characteristics/Aspects	Opinion/ Responses	Frequency	Percentage
Appearances of the booklet, charts, flip books and multimedia disc.	Appealing	231	96.25
	Somewhat Appealing	9	3.75
Caption of the booklets, charts, flip books and multimedia disc.	Appropriate	235	97.92
	Somewhat Appropriate	5	2.08
Size of the letters	Appropriate	228	95.00
	Somewhat Appropriate	12	5.00
Illustrations-Diagrams	Suitable	236	98.33
	Somewhat suitable	4	1.67
Illustrations-Colour combinations	Attractive and suitable	237	98.75
	Somewhat attractive and suitable	3	1.25
Understandability of language	Easy to Understand	239	99.58
	Somewhat easy to understand	1	0.42
Nature of Language	Suitable	234	97.5
	Somewhat suitable	6	2.5
Contents of the booklets	Suitable	240	100.00
	Somewhat suitable	0	0
Number of technical Words used	Too many	10	4.17
	Few in number	230	95.83
Nature of technical Words used	Understandable easily	231	96.25
	Somewhat understandable	9	3.75
Size of words	Appropriate	229	95.42
	Somewhat appropriate	11	4.58
Sequence of information Provided	Sequence wise	235	97.92
	Somewhat sequence wise	5	2.08
Applicability of subject matter	Applicable	233	97.08
	Somewhat applicable	7	2.92

Testing of multimedia kit

Opinion of young farmers about different aspects/ characteristics of multimedia kit:

The data in table 2 reveal that the 96.25 per cent of the young farmers had reported that the appearance of the booklet, charts, flip books and multimedia disc was appealing and only 3.75 per cent of the young farmers reported that the appearance of the booklet, charts, flip books and multimedia disc was somewhat appealing. Majority of the respondents also gave their opinion regarding the other aspect of the testing of multimedia kit i.e., caption of the booklet was appropriate (97.92%), size of the letters was also appropriate (95.00%), illustrations/ diagrams were suitable (98.33%), illustrations/ color combinations were attractive and suitable (98.75 %). Understandability of language of booklets, charts, flip booklets and multimedia disc was very easy (99.58 %), nature of

language was suitable (97.5%), contents of the booklets was suitable as reported by 100 per cent of young farmers, number of technical words used were few in number as reported by 95.83 per cent, number of technical words were easily understandable (96.25 %), the information in the booklets, charts, flip book and multimedia disc was provided sequence wise (97.91 %) and subject matter given in the booklets, charts, etc. was applicable in field situations (97.08%).

Table 3: Gain in knowledge of young farmers with the use of multimedia kit during PCPs/ training

Subject matter areas	Pre-test Overall Mean Knowledge score	Post-test Overall Mean Knowledge score	Gain in Overall Knowledge score	t value
Wheat Cultivation	0.443	0.771	0.328	4.46*
Rice Cultivation	0.418	0.736	0.318	10.99*
Cotton Cultivation	0.466	0.804	0.338	11.66*
Sugarcane Cultivation	0.486	0.781	0.295	7.444*
Maize Cultivation	0.576	0.876	0.300	8.15*
Dairy Farming	0.308	0.773	0.465	17.29*
Poultry Farming	0.233	0.727	0.494	14.98*
Mushroom Cultivation	0.177	0.746	0.569	10.65*
Bee Keeping	0.304	0.772	0.468	18.07*
Soil and Water Testing procedure	0.255	0.915	0.660	11.57*

*Significant at 1 per cent level of significance.

Gain in Knowledge of young farmers

The data in table 3 revealed that there was maximum gain in knowledge in the area of Soil and Water Testing i.e., (0.660) followed by Mushroom Cultivation (0.569) and Poultry Farming (0.494), Bee Keeping (0.468), Dairy Farming (0.465), Cotton Cultivation (0.338), Wheat Cultivation (0.328), Rice Cultivation (0.318), Maize cultivation (0.300), and Sugarcane Cultivation (0.295). The increase in the knowledge level of young farmers was significant due to the use of various teaching aids included in the multimedia kit during PCPs/ training programmes/ PCs in the villages/KVKs. Therefore, it is suggested that the experts should use the media kit comprised of booklets, charts, flip books, CDs, etc. more frequently in the training programmes.

CONCLUSION

The results of the study showed that the multimedia kit consisting of booklets, charts, flip-books and CDs were appropriate and effective in dissemination of farm information among farmers. Farmers had a significant gain in knowledge on various aspects of cultivation of crops and other technologies due to the use of multimedia kit.

Impact Assessment of Empowerment of Women in Agriculture

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ABSTRACT

For removing gender inequality, an effective approach is to mobilize farm women self-help groups coupled with interventions for capacity building. An impact study of socio-psychological attributes of empowerment was conducted. This study was conducted under the NATP mission-mode project entitled 'Empowerment of women in agriculture' where 600 farm women were mobilized to form 40 SHGs. A series of awareness camps, training programs and related interventions were carried out and data were collected for 'before and after' experiences of becoming SHG members and undergoing capacity building interventions. The study conducted in 11 villages of three rural blocks of Delhi revealed an enhanced shift in confidence, self-esteem, decision making pattern, capacity enhancement, social empowerment and a favourable attitude towards entrepreneurship development and improved agriculture and animal husbandry practices.

In order to achieve the ultimate goal of gender equality, gender issues need to be mainstreamed to support women with information, training and technology. In the changing scenario the need for endeavors are being redesigned to focus on women through appropriate sensitization towards their contribution to the agriculture system. The major thrust is their empowerment through capacity building, greater opportunities, access to resources and appropriate interventions. An effective approach is mobilization of farm women towards self-empowerment by organizing them into Self Help Groups. Empowerment is a multidimensional process which enables individuals or groups the realization of their full identity and powers in all spheres of life. Empowering women socio psychologically is a crucial decisive step. In fact the core elements of empowerment have been defined as the agency (the ability to define one's goals and act upon them), awareness of gender power structures, self-esteem and self-confidence (Kabeer, 2001).

Impact assessment has emerged as an important aspect of development interventions to measure the impact of programs on people's lives in order to bring a more sustainable and equitable biophysical and human environment. The focus of concern of social impact assessment is a proactive stance to development outcomes, not just the identification or amelioration of negative or unintended outcomes. (IAIA, 2003). Social impact assessment for empowerment of women needs to consider the various ways in which empowerment has been conceptualized. It has been viewed as a process through which

women, individually and collectively, become aware of how power relations operate in their lives and gain self-confidence and strength to challenge gender inequalities. Keeping the above in mind an impact study of socio psychological attributes of farm women through self help group formation and other project interventions like capacity building and drudgery reducing technological interventions is imperative.

The objective of the study was impact assessment of the socio psychological empowerment of women in agriculture through SHG formation, capacity building interventions and micro finance.

METHODOLOGY

The study was conducted under NATP mission-mode project entitled 'Empowerment of Women in Agriculture'. As an endeavor towards social, psychological and economic empowerment 600 farm women were mobilized to form 40 self-help groups with 15 members in each group. A series of awareness camps, training programs and related interventions were carried out among them and data were collected before and after experiences of becoming SHG members and undergoing capacity building interventions. The study was conducted in 11 villages of 3 rural blocks of Delhi viz. Nazafgarh, Kanjhawala and Alipur. Data were collected by means of specifically developed interview schedule which was semi-structured encompassing socio psychological parameters detailed below:

Self confidence

It is one of the important personality dimensions of an individual that enables one to move from a position of powerlessness to empowerment. As a result of participation in self-help group and capacity building training it is assumed that women gain confidence and enhance their capacities for achievement.

The variable was measured in terms of confidence to talk within family, in SHG meetings and in public (in panchayat / gram shabha meetings / kisan mela / goshtis / sammelans).

Self esteem: This is a very important component of empowerment, which refers to the image of self that one carries always within and is a significant parameter. If self-esteem of a woman is low it means she perceives herself to be less capable and this becomes a constraint in one's performance. On the contrary, an individual with high self-esteem is likely to perform better. This attribute is directly related to her movement towards empowerment and was measured by explaining the concept of self-esteem, self image in the family, self-image in community, self-reliance and feeling of security.

Decision-making: Studies have revealed low participation in decision-making by rural women. Since participation in decision-making is an important aspect of an empowered individual, it was considered necessary to ascertain the impact of project interventions on the SHG members. Decision-making pattern was assessed in areas of children's education, family planning, buying and selling land, property and household goods, daily household expenditure, family and social functions, agriculture and animal husbandry.

Capacity enhancement: In view of livelihood security for rural women, the process of capacity building is a major task. The human centered approach for capacity enhancement included seven main components viz. ability to take risk, ability to understand and solve problems, ability to try new ventures, ability to take criticism, conflicts resolution, hope and overall satisfaction with life with added meaning to their lives.

Social Empowerment: The 'power-with' aspect of empowerment is a major goal in sustainable development. This was assessed in terms of leadership aspects, team spirit, communication skills, assertiveness and participation in village/ community activities as a result of SHG membership and project interventions.

Attitude: In the present study attitude of farm women towards modern scientific technologies in agriculture and animal husbandry was studied to assess their pre disposition to the scientific aspects of agriculture and allied activities. Their attitude towards entrepreneurship development was also gauged. To find out the extent to which their attitudes were influenced by the study initiatives as a consequence of their participation in SHGs and the exposure provided to them, their attitude scores on three dimensions viz. agriculture, animal

husbandry and entrepreneurship development were compared with scores obtained by the control group sample of farm women who were not participants.

RESULTS AND DISCUSSIONS

Confidence Building: The socio-psychological impact assessment of SHG members is given in Table I in terms of confidence building, self-esteem, decision-making, capacity enhancement and social empowerment. In the present study the level of confidence prior to the SHG formation was measured on a five-point scale covering items on ability to talk freely in the family, public meeting and SHG groups. On the basis of 'before' and 'after' mean scores of the groups a shift of 1.16 and 1.93 points was observed (on a 1-5 point scale) for confidence to talk within family and SHG meetings respectively. Women expressed a feeling of heightened confidence to talk and express their views openly because of group interaction. Amongst the five parameters the overall shift was the greatest in this area thereby making a great impact in terms of increased confidence levels.

Table I: Means scores of parameters of impact assessment for empowerment of women in agriculture.

S. No.	Parameters	'Before' and 'After' Mean Scores		
		Before	After	Shift
A. Confidence building				
I.	Confidence to talk within family	2.97	4.13	1.16
II.	Confidence to talk in SHG meeting	2.46	4.39	1.93
III.	Confidence to talk in public (in panchayat/ Gram Sabha meeting/ in Kisan Mela/ Goshti/Sammelan)			
	Average	2.61	3.90	1.29
B. Self esteem				
I.	Self-esteem	3.28	4.46	1.18
II.	Self image in the family (How useful you think you are in your family)	2.34	3.00	0.66
III.	Self image in the community (How useful you think you are to your community)	2.48	3.69	1.21
IV.	Self reliance / independence	2.57	3.66	1.09
V.	Feeling of security (Economic, general)	2.97	3.60	0.63
	Average	2.72	3.68	0.95
C. Decision making pattern pertaining to:				
I.	Children's education	3.40	4.0	0.60
	Girls	3.32	4.05	0.73
	Boys	3.48	3.95	0.47
II.	Family Planning	3.50	4.02	0.52
III.	Buying and selling land, property and households goods	3.06	3.68	0.62
IV.	Daily household expenditure	3.56	3.89	0.33
V.	Family and social functions	3.09	3.52	0.43
VI.	Animal Husbandry/ Agriculture	3.26	3.57	0.31
	Average	3.33	3.83	0.50
D. Capacity Enhancement				
I.	Ability to take risk	2.66	3.48	0.82
II.	Ability to understand and solve problems	3.27	4.00	0.73

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III. Ability to try new ventures	2.61	3.59	0.98
IV. Ability to take criticism	3.19	3.90	0.71
V. Conflict Resolution	3.19	3.90	0.71
VI. Hope	2.54	4.36	0.68
VII. Overall Satisfaction with life	3.34	4.02	0.68
Average	2.97	3.89	0.92
E. Social empowerment			
I. Leadership aspects	2.58	3.32	0.94
II. Team spirit (ability to work with others)	3.54	4.19	0.65
III. Communication Skills	2.99	4.17	1.18
IV. Assertiveness	3.37	4.51	1.14
V. Participation in group activities	3.13	4.13	1.00
VI. Participation in village/community activities	3.53	3.21	0.68
Average	3.02	3.95	0.93

Self-esteem: Self help group member's self esteem was measured to assess how they perceived their own image within the family and community. After the SHG formation the data revealed on the whole 0.9 shift on a 1-5 point scale showing thereby that participation in SHG and its activities has refined their worth in their own eyes. Greater change was seen in case of their image in community. This indicates that SHG membership and project intervention gave a sense of enhanced status feeling to the rural women.

Decision-making: Decision-making was considered for certain chosen areas, which have significance for rural house holds. On the whole a shift of 0.50 points (on 1-5 point scale) was observed in the members post SHG formation, and project interventions. A negligible shift was observed in terms of decisiveness for those who were taking decisions themselves and jointly. A minor shift was observed in this area due to the embedded social system.

Capacity enhancement: Capacity building measures strengthen group approach. The five major components for capacity enhancement were measured on five-point continuum prior as well as after SHG formation. The comparison of average scores on the basis of the parameters pooled together reveals a positive shift of 0.92 points because of SHG exposure. Further variation among group members was studied with respect to hopes and aspirations and overall satisfaction with life. It was seen that there was a shift of 1.5 points in hope and 1.0-point shift for satisfaction with life. Optimistic attitude towards life leads to more active participation, which is an essential component for group organization. However, a group to what extent can remain psychologically knit depends upon its group composition, cohesion and group dynamics.

Social empowerment: Social empowerment holds a crucial significance in close - knit societies especially the farm household. There was a minor shift in all the social attributes taken into consideration. As far as empowerment is concerned (leadership, communication skills, assertiveness, coordinating member activities) it was found that mutual supporting coalition results in more cohesion activities among the group members and greater participation in group.

Furthermore an analysis of the individual categories of the five major parameters revealed the greatest shift was observed in case of 'confidence to talk in SHG meetings' and 'hope' followed by 'self-esteem' and 'communication skills'. All these qualities are important for empowerment to take place.

Attitude of farm women towards improved agricultural and animal husbandry technologies and entrepreneurship development.

The impact of the project on SHG members was also assessed in terms of change in attitude towards agricultural technologies, improved animal husbandry practices and entrepreneurship development. The results are given in tables 2,3 and 4 respectively.

Attitude towards improved agricultural technology: On the whole about three fourth of the women (75.27%) expressed their favorable attitude towards agriculture technology while only 15 percent of those not exposed to the study were having favorable attitude towards the same. In the control group majority (56.67) were undecided whereas only 3.61 percent of the experimental group was undecided. (Table 2) A favorable attitude towards improved agricultural technologies goes a long way in increasing productivity by reducing drudgery and releasing the time of women to diversify.

Table 2: Distribution of respondents by attitude towards improved agricultural technologies.

Attitude towards improved agricultural technologies	Experimental Group N=360		Control Group N=60	
	F	%	F	%
Favourable	271	75.27	9	15
Undecided	13	3.61	34	56.67
Un favourable	76	21.11	17	28.33

Attitude towards improved animal husbandry: The SHG members of the present study showed greater inclination towards improved animal husbandry practices (68.88 %) whereas in control group only 21.67 per cent showed favourable attitude. In experimental group 27.22 per cent were unfavourable whereas 51.67 percent did not have a favourable attitude towards improved animal husbandry in control category (Table 3). The positive response towards the same can be because dairy enterprise has wide avenues and due to participation of farm women in trainings.

Table 3: Distribution of respondents by attitude towards improved animal husbandry.

Attitude towards improved agricultural technologies	Experimental Group N=360		Control Group N=60	
	F	%	F	%
Favourable	284	68.88	13	21.67
Undecided	14	3.88	16	26.67
Un favourable	98	27.22	31	51.67

Attitude towards entrepreneurship development

According to the table 4, in experimental group 73.77 percent favored the concept of entrepreneurship development for moving towards economic self-reliance. In control group 18.33 percent were favourable whereas a major chunk fell in to the category of unfavourable and undecided. Economic emancipation through self help approach was one of the crucial aims behind the study and positive attitude of the respondents for entrepreneurship development can be exploited for empowerment.

Table 4: Distribution of respondents by attitude towards entrepreneurship development

Attitude towards improved agricultural technologies	Experimental Group N=360		Control Group N=60	
	F	%	F	%
Favourable	248	68.88	11	18.33
Undecided	14	3.88	23	38.33
Un favourable	98	27.22	26	43.33

CONCLUSION

The impact of the study on the influence of SHG membership and project interventions upon socio-psychological parameters based on "Before and After" design reveals that rural women find drastic change in their personality and self image. A social and psychological positive impact of rural women not only brings increased efficiency but also improves their quality of life. Self help group approach can

undoubtedly focus on development of rural women through appropriate interventions for capacity building and entrepreneurship development. The greatest impact was seen in case of confidence, especially confidence to talk in SHG meetings. This was followed by self esteem and self image about and usefulness to community. Both these factors have great influence on empowerment. Another important shift was in case of social empowerment and capacity enhancement. Alleviation of poverty, despite being on the agenda of the Government, seems indomitable. Viable comprehensive and bold initiatives should strive for concerted and collective inroads into poverty. Conceptually elaborate, integrative and holistic approach to socio-psychological parameters can produce a deep impact on sustainable development. The group approach stems from the underlying assumption that the poor will help themselves through mutual help. Building capacity to manage their own resources, decision-making capabilities and self-confidence together make self help group approach an effective way to empowerment.

Impact studies of Self Help Groups have become indispensable because earlier initiative suffered from isolated approach, desperate thrust and lack of adequate focus on substantive issues of sustainability and social intermediation. Implications drawn from the study revealed that self-help group members stand better proven than non-SHG members in socio-psychological factors. Internal group solidarity and collective strength need to be identified as key points in building viable SHGs along with microfinance and capacity building interventions.

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Training Needs of Potato Growers

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ABSTRACT

A Study on training needs of potato growers in Jalandhar district of panjab was undertaken. The sample consisted of 150 potato growers. The results revealed that a majority of farmers needed a medium to high level of training in areas like soil management, seed rate, sowing, application of fertilisers, irrigation of drainage, weed control, pest management, harvesting and marketing of storage.

The present production of potato could be increased considerably if the available technology is effectively transferred to the farmers. Our training programmes need to focus more on transferring of new technology from the confines of laboratories and research institutes to the farmers and make them result oriented. Its profitability needs to be enhanced further, but still profitability of potato growing is beset with many constraints faced by potato growers due to production and marketing. So, therefore the potato growers need to be properly trained in the latest improved cultivation practices for realizing more productivity and production of crop. Keeping all these aspects in view the present study entitled "A study of Training needs of potato growers regarding potato cultivation" with the objective that the data generated by this study will provide much needed feed back to orient the research as well as extension strategies of Punjab Agricultural University and State Department of Agriculture.

METHODOLOGY

The present study has been conducted in Jalandhar district of Punjab state. Out of 10 blocks of Jalandhar district, two blocks having maximum area under potato cultivation were selected and from each selected block, five villages, having maximum area under potato were chosen by using non-probability sampling i.e. convenience sampling. So in all 10 villages were selected as sample villages for this study. A list of all potato growers with minimum of one acre area under potato cultivation was prepared. Fifteen potato growers belonging to small medium and large categories of operational land holding were taken from each of the selected villages. Thus 150 potato growers were finally chosen for the study.

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RESULTS AND DISCUSSION

Training needs in the area of 'establishing potato farm'

The study revealed that the sub-area 'Soil pH' was ranked first with 'medium' training need and it got mean score of 0.96, whereas the 'Climatic requirement for growing of Potato' had been placed at the bottom with 'low' training need and a mean score of 0.21.

On further perusal the distribution of respondents for the sub-area 'Soil pH' ranked first, it can be said that 37.33 per cent of the respondents reported it as 'most needed' 41.33 per cent 'not needed' and only 21.33 per cent reported it as 'needed'.

The other sub-area 'soil texture and structure' got second rank with mean score 0.78 with 'medium' training need. The sub-area 'climatic requirements for growing of potato' ranked at the bottom with mean score 0.21 and the extent of training need was 'low'.

Training needs in the area of 'selection of varieties'

The study revealed that sub-area 'awareness regarding diseases/pests resistant varieties' got the first rank with a mean score of 1.66 and the extent of training need in this sub-area was 'high'. The least ranked sub-area for training need was 'information regarding improved varieties', with a mean score of 0.96 and 'medium' extent of training need.

Other sub-area 'source of availability of varieties' attained second rank with mean scores of 1.32 having 'high' extent of training need. The sub-area which ranked lowest was 'information regarding improved varieties' whereas 21.33 per cent felt as 'most needed', 53.33 per cent as 'needed' and 25.33 per cent considered it as 'not needed' training.

Training needs in the area of 'soil management'

The study revealed that first rank for training was given to the sub-area 'soil sampling for fertilizer requirements' with mean score of 1.68 and having 'high' extent of training need. The respondents with 'low' training need and a mean score of 0.64 have placed the sub-area 'Crop rotation for potato' at the bottom in ranking position. On further analysis of the response pattern regarding sub area, 73.33 per cent of the respondents reported that the training is 'most needed' in the sub-area 'soil sampling for fertilizer requirements', 21.33 as 'needed' and only 5.33 per cent of the respondents considered it as 'not needed'. The sub-area which got last rank revealed that 54.66 per cent of the respondents considered it as 'not needed' 26.66 per cent as 'needed' and 18.66 per cent as 'most needed' for training in the sub-area of 'crop rotation for potato'.

Training needs in the area of 'seed rate and sowing'

The study revealed that 'time of earthing up' got the highest rank position with a mean score of 1.50 and the 'high' extent of training need whereas the sub-area i.e. 'time of sowing' has been found to be at the lowest with a mean score of 0.37 with low extent of training need.

On further observation of the response pattern of the above mentioned sub area, it was found that 57.33 per cent of the

respondents reported that it was 'most needed' and 36.00 per cent reported as 'needed'. There was only 6.66 per cent of the respondents who considered it as 'not needed' for the training. The sub-area of 'method of sowing (ridges/flat)' and 'seed rate for raising potato' have got third and fourth rank with 'low' extent of training need and mean score of 0.57 and 0.45 respectively. Likewise, the response pattern of the sub-area 'time of sowing' which was ranked lowest, revealed that only 13.33 per cent of respondents considered it as 'needed', 12.00 per cent as 'most needed' and 74.66 per cent of them reported it as 'not needed' for the training.

Training need in the area of application of 'manures and fertilizers'

In the area of applications of 'Manures and Fertilizers' the sub-area 'Dose of fertilizers application' got the highest rank with mean score of 1.39 and having 'high' extent of training need. The lowest rank was found in sub-area 'Time of application' with mean score of 0.66.

The data in Table 1 indicated that 54.00 per cent of the respondents expressed it as 'most needed' for training 31.33 per cent of them perceived it as 'needed' and 14.66 per cent considered it as 'not needed' for the sub-area 'dose of fertilizer application'.

Table 1: Training needs in the area of 'application of manures and fertilizers' (sub-area wise) (N=150)

Sub-areas	Most needed F	%	Needed F	%	Not needed F	%	Mean score	Rank	Extent of training need
Use of organic manure (compost/FYM etc.)	42	28.00	74	49.33	34	22.66	1.05	3	Medium
Choice of fertilizers	32	21.33	68	45.33	50	33.33	0.88	4	Medium
Dose of fertilizers	81	54.00	47	31.33	22	14.66	1.39	1	High
Method of fertilizers application	64	42.66	72	48.00	14	9.33	1.33	2	High
Time of application	32	21.33	36	24.00	82	54.66	0.66	5	Low

Table 2: Training needs in the area of 'irrigation and drainage' (sub-area wise) (N=150)

Sub-areas	Most needed F	%	Needed F	%	Not needed F	%	Mean score	Rank	Extent of training need
Water requirement of potato crop	22	14.66	92	61.33	36	24.00	0.90	3	Medium
Taking water sampling for testing	54	36.00	88	58.66	8	5.33	1.30	1	High
Water logging problems and drainage technique	12	8.00	32	21.33	106	70.66	0.37	4	Low
Time interval of irrigation and method of irrigation	42	28.00	102	68.00	6	4.00	1.24	2	Medium

The sub-area which obtained second and third ranks were 'method of fertilizer application' and 'use of organic manure (compost/FYM, etc.)' with mean score of 1.33 and 1.05 with 'high' and 'medium' extent of training need. On analyzing the response pattern of the above explained sub-area which got the lowest rank i.e. 'Time of application' 54.66 per cent expressed it as 'not needed' for training and 24.00 per cent as 'needed' and 21.33 per cent of respondents reported it as 'most needed'.

Training needs in the area of 'irrigation and drainage'

The data presented in Table 2 indicate that the sub-area 'Taking water sample for testing' got the highest ranking position with a mean score of 1.30 and extent of training need was 'high'. The sub-area 'water logging problems and drainage techniques' was ranked bottom indicating 'low' extent of training need with a mean score of 0.37.

The detailed perusal of Table 6 further revealed that the 36.00 per cent of the respondents indicated it as 'most needed' for training, 58.66 per cent of the respondents indicated it as 'needed' for training, and only 5.33 per cent of potato growers said that training is 'not needed' in sub-area 'taking water sampling for testing'.

On further analysis the response pattern of sub-area the second and third rank was given to 'Time interval of irrigation' and 'water requirement of potato crop' with a mean score of 1.24 and 0.90 respectively and extent of training need was 'medium'.

The last rank (fourth) was given to sub-area 'Water logging problems and drainage techniques' by 70.66 per cent of the

respondents indicating as 'not needed', 21.33 per cent of the respondents viewed as 'needed' and 8.00 per cent of respondents reported it as 'most needed' for the training.

Training need in the area of 'weed control'

The study showed that the first rank for training was given to the sub-area 'Awareness about the use of various herbicides' with mean score of 1.44 and having 'high' extent of training need. The sub-area 'Time and method of application' has been placed at the bottom of ranking position by the respondents with medium extent of training need with a mean score of 1.20.

The detailed perusal of the response pattern of the above said sub area revealed that 54.66 per cent of the respondents reported that training is 'most needed' in the sub-area 'Awareness about the use of various herbicides' and 34.66 per cent of respondents considered it as 'needed' and only 10.66 per cent considered it as 'not needed'.

Dose of weedicide got second rank with mean score of 1.37 having 'high' extent of training need. In the sub-area 'Time and method of application' which got last rank, 18.66 per cent of the respondents considered it as 'not needed', 42.00 per cent as 'needed' and 39.33 per cent as 'most needed' for training.

Training needs in the area of 'insect-pests and diseases'

The data presented in Table 3 indicate that the first rank for training needs in the area of 'Insect-pests and diseases' have been credited to the sub-area 'Cause of spread' with mean score of 1.80 and has 'high' extent of training need.

Tables 3 : Training needs in the area of 'Insect, pest and disease' (sub-area wise) (N=150)

Sub-areas	Most needed F	%	Needed F	%	Not needed F	%	Mean score	Rank	Extent of training need
Identification of insect pests and disease	102	68.00	48	32.00	-	-	1.68	3.5	High
Cause of spread	119	79.33	31	20.66	-	-	1.80	1	High
Time and method of control	108	72.00	36	24.00	6	4.00	1.68	3.5	High
Awareness about use of various insecticides and pesticides	99	66.00	42	28.00	9	6.00	1.60	5	High
Handling of insecticide and pesticides	104	69.33	46	30.66	-	-	1.69	2	High
Residual effect of insecticides and pesticides	92	61.33	54	36.00	4	2.66	1.58	6	High

The sub-area 'Residual effects of insecticides and pesticides' had been placed by the respondents at the bottom with corresponding training need mean score of 1.58 and the extent of training need was 'high'. On further observation of the response pattern it was found that 79.33 per cent of potato growers reported it as 'most needed' and 20.66 per cent as 'needed' in the sub-area 'cause of spread'.

The second rank was given to the sub-area 'handling of insecticide and pesticides' with a mean score of 1.69 and having 'high' extent of training need. The combined rank was given to the sub-area of 'Identification of insect, pests and diseases' and 'Time and method of control' with a mean score of 1.68 respectively and extent of training need was 'high'.

On further scrutiny it was found that the sub-area 'Residual effects of insecticides and pesticides' ranked at bottom and 61.33 per cent of the respondents expressed that training is 'most needed' and 36.00 per cent said that training is 'needed' and 2.66 per cent said that training is not needed in this sub area.

Training needs in the area of 'Harvesting'

The study revealed that in 'Harvesting' the sub-area 'Time of harvesting' was ranked first by the respondents for their training with 'medium' extent of training need and with mean score of 1.10. It can be seen from the above findings that 23.33 per cent of the respondents indicated training as 'most needed' in 68.00 per cent as 'needed' and 10.66 per cent as 'not needed' in above mentioned sub area. Whereas methods of digging potatoes received the 2nd and last rank by potato growers for training whereas only 16.00 per cent of the respondents perceived it as 'most needed' while 50.66 per cent and 33.33 per cent reported as 'needed' and 'not needed', respectively.

Training needs in the area of 'marketing and storage'

The study revealed that the sub-area 'marketing price' got the top rank with 'high' training needs and a sub-area 'grading' had been placed at the bottom in ranking with 'medium' training need and mean score of 1.16. On further analysis it can be seen that in the sub area 'marketing price' 35.33 per cent of the respondents indicated 'most needed', 60.66 per cent as 'needed' and only 4.00 per cent respondents expressed as 'not needed' for training. The sub-area 'marketing of potatoes' got 2nd rank

having 29.33 per cent of respondents indicated 'most needed', 57.33 per cent as 'needed' and only 13.33 per cent 'not needed' training in that sub area. In the sub-area which was ranked lowest i.e. 'grading' only 21.33 per cent respondents felt as 'most needed', 60.66 per cent as 'needed' and 4.00 per cent considered as 'not needed' for training.

Training needs of potato growers with respect to various areas of potato cultivation (overall)

The findings in relation to training needs (overall area-wise) of the respondents have been presented in Table 4. The area of 'Insect pests and diseases' had the highest training need with mean score of 1.67 as 'extent of training need was 'high'. The area of 'weed control' has been ranked second with mean score of 1.34 and extent of training need was 'high'. The third, fourth and fifth rank was given to 'selection of varieties', 'soil management' and 'marketing and storage', with mean scores of 1.32, 1.16 and 1.09 respectively and having 'medium' extent of training need. On the other hand, the areas 'Application of manures and fertilizers', 'harvesting', 'irrigation and drainage' and 'seed rate and sowing', have secured sixth, seventh, eighth and ninth ranks with mean score of 1.06, 0.96, 0.95 and 0.87, respectively. The extent of training need was 'medium' for sixth and 'low' for seventh, eighth and ninth in area of potato cultivation.

'Establishing potato farm' has got last rank with mean score of 0.65 and extent of training need was 'low'.

Table 4: Extent of training need of potato growers with respect to various areas of potato cultivation (overall) (N=150)

Area	Mean score	Rank	Extent of training need
Establishing potato farm	0.65	10	Low
Selection of varieties	1.32	3	Medium
Soil management	1.16	4	Medium
Seed rate and sowing	0.87	9	Low
Application of manure and fertilizers	1.06	6	Medium
Irrigation and drainage	0.95	8	Low
Weed control	1.34	2	High
Insect, Pest and disease	1.67	1	High
Harvesting	0.96	7	Low
Marketing Storage	1.09	5	Medium
Average training need score			
0.65 to < 0.99			Low
0.99 to < 1.33			Medium
1.33 to 1.67			High

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Development of Human Interest Readability Formula for Farm Publications

B.S. Siddaramaiah and N. Nomerh Kumar

ABSTRACT

The present study was undertaken to investigate the word and sentence factors related to human interest aspect of readability and to develop a readability formula for measuring human interest value of farm publications. A sample of 150 reading passages were selected and analysed for their variation in two readability variables viz., (i) use of personal words and (ii) use of personal sentences. A readability formula was developed using regression analysis technique. Reliability and validity of the formula have been established by standard statistical techniques.

A readability formula is a method of estimating the probable success a reader will have in reading and understanding a piece of writing. It identifies the elements in writing that are related to readers success. The elements for success could come from the mechanical characters or style of writing. Brinton and Danielson (1958), making use of factor analysis, identified two sets of variables viz., vocabulary factor and sentence factors affecting the comprehension of print materials. Continuing the work on this line, Stolorow and Newman (1959), through inter correlation matrix, identified 23 variables accounting for 92.8 per cent of the total variance in comprehension scores of readers. From them, he identified two groups of factors and labelled them as "relative difficulty of words" and "relative difficulty of sentence" which accounted for 34 percent and 20 per cent of variation, respectively. Hence, these studies point out that two main factors, which affect the readability are words and sentences.

The present investigation was therefore undertaken mainly to investigate the word and sentence factors related to readability and to develop a suitable readability formula for Kannada language.

METHODOLOGY

Selection of print materials

A wide variety of print materials are utilised in the programmes related to farmers' education. The daily newspapers in Karnataka have devoted a substantial portion in their editions for publishing information on agriculture, besides, a good number of farm magazines, which carry exclusive information on farming. Further, State Agricultural Universities are also publishing books and booklets related to

farming. Hence, it was decided to select the following three categories of print media connected with farmers' education.

1. Daily newspapers (Kannada)
2. Farm magazines (Kannada)
3. Farm bulletins (Kannada)

Selection of newspapers:

A list of all the daily newspapers published in Kannada was prepared. There were in all 332 Kannada dailies published from various district headquarters in Karnataka. It was essential to select newspapers having the largest circulation, in order to ensure utility of the study. The two newspapers having the largest circulation and devote one full page in a week for publishing information on agriculture viz., (i) Prajavani and (ii) Samyuktha Karnataka were selected for the purpose of conducting this study. All the weekly farm pages from July to December 2001 totalling to 26 and 27 pages formed the sample.

Selection of farm magazines:

There are more than 20 Kannada farm magazines published in the State. Based on their highest circulation, a list of 12 monthly farm magazines was prepared and four farm magazines were randomly selected. The total number of pages from these farm magazines came to 590.

Selection of farm bulletins:

The University of Agricultural Sciences, Bangalore is publishing a large number of books, booklets, farm bulletins etc. related to agriculture. Looking to the wider applicability and relevance of the message to the study area, it was decided to select the two farm bulletins relating to cultivation practices on

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agriculture crops and horticulture crops. Each one of these bulletin ran to more than 200 pages in demy 1/8th size printed in Kannada.

Selection of sample passages:

For the purpose of studying readability, there is a need to have representative sampling of the print material. In the present study, a sample of 150 pages was drawn as detailed below:

Name of the print material	No. of samples drawn
Prajavani daily newspaper	26
Samyuktha Karnataka daily newspaper	27
Farm magazines	37
Cultivation practices for Agricultural crops	28
Cultivation practices for Horticulture crops	32
Total	150

A sample of 100 words was drawn beginning with first paragraph. If the paragraph contains any table and figure such paragraphs were excluded for the purpose of sampling. No sample was taken from the leads and endings of the articles as these portions were considered nonrepresentative of the whole article in terms of quality. If the first sample analyzed consumed two paras, for the second sample the counting of words will start from the 3rd para. The same procedure was followed in case of all 150 samples.

Rating of articles for human interest value

All the 150 sample passages from five types of print materials were presented to 50 farmers attending the training at Farmers Training Institute, Bangalore and they were requested to read the articles thoroughly. Based on the human interest value of the articles contained in them, the respondents were requested to rate the articles on a continuum of 5 groups of human interest value as indicated below. Scoring was done by giving a weightage of 1 for dull, 2 for mildly interesting, 3 for interesting, 4 for very interesting and 5 for dramatic category. An index of human interest value was calculated using the formula given below:

Scale of human interest	Scores assigned
Dull	1
Mildly interesting	2
Interesting	3
Very interesting	4
Dramatic	5

The index of human interest value was calculated using the formula given below:

Scores obtained on the scale of human interest
Index of Human interest $\frac{\text{Sum of scores}}{\text{Maximum possible score i.e., 5}} \times 100$

The indices of human interest value were calculated for all the 150 passages under the five sub groups.

Reliability of judgement:

The reliability of judging articles into different grades of human interest value was estimated by the split half method. The respondents who judged the reading passages in to five groups of human interest value were divided into two groups by odd - even method. The ranking given by the judges for the five groupings i.e., (i) Dull, (ii) mildly interesting, (iii) interesting, (iv) very interesting and (v) dramatic were considered and the mean scores were arrived at for the two groups of the respondents. Then, the reliability coefficient was estimated for these values by using the Spearman Brown - prophecy formula. The reliability coefficient, which was 0.86, indicated the reliability of judging by the farmers.

Selection and measurement of independent variable

Personal Words:

According to Flesch (1960) personal words include all names with natural gender, all pronouns except neuter pronouns and the words "people" (used with plural verb) and "folks". This definition was accepted to operationalise personal words in the present study also. The total number of personal words in the 100 word samples was counted and expressed as the percentage of personal words.

Personal sentences: Personal sentences are defined as sentences marked by question marks, commands, requests and other sentences directly addressed to the readers, explanations and grammatically incomplete sentences whose meaning has to be inferred from the context (Flesch, 1948). This definition was considered in the present study and the following three types of sentences were counted.

- Spoken sentences marked by quotation marks or other wise.
- Questions, commands, requests and other sentences directly addressed to the reader.
- Exclamations and grammatically incomplete sentences whose meaning has to be inferred from the context.

The number of personal sentences out of 50 sentences was calculated and used directly in the analysis of data.

Development of Human Interest readability formula

At the first instance, the data on dependent and independent variables were subjected to correlation analysis. If the variables

showed significant relationship, it was decided to use those variables for fitting the regression equation. Regression analysis was worked out by adopting the procedure suggested by Guilford (1956).

RESULTS AND DISCUSSION

Variables related to Human Interest aspect

The details on human interest value of the passages investigated are shown in Table-1. The average human interest value of the passages was 54.24. This means that the articles are in the middle range of human interest value. The human interest value of the articles in the two newspapers as well as the farm magazines was less than the average. However, the two farm magazines on agriculture and horticulture were found to have higher human interest value of 59.97 and 63.87, respectively.

Table 1: Human Interest value of the passages studied

Type of passage	No. of samples	HI Scores (%)
Prajavani daily	26	44.67
Samyuktha Karnataka daily newspaper	27	47.13
Farm magazines	37	53.92
Cultivation Practices for Agricultural crops	28	63.87
Cultivation Practices for Horticultural crops	32	59.97
Average	150	54.24

HI = Human Interest

Selection of readability variables

The two readability variables selected for development of human interest formula are (i) personal words and (ii) personal sentences, as has been done by earlier researchers like Flesch (1948). The mean values of these two readability variables for the five types of reading passages investigated are given in Table-2.

Table 2: Mean values of the readability variables relating to word and sentence factors

Type of passages	% of personal words		No. of personal sentences per 50 sentences	
	Mean	S.D.	Mean	S.D.
Prajavani daily	15.85	2.73	7.84	5.82
Samyuktha daily newspaper	14.89	3.52	8.07	6.05
Farm magazines	15.84	2.93	6.05	5.13
Cultivation Practices for Agricultural crops	18.68	2.84	16.39	5.10
Cultivation Practices for Horticultural crops	15.69	2.95	15.90	5.20
Overall	16.17	3.20	10.83	5.46

Relationship between human interest scores and the readability variables

The correlation test was applied to find out the relationship between human interest scores and the two readability variables. The results are reported in Table-3. As evident from the table, the number of personal words and the number of personal sentences were positively and significantly related to human interest scores. This implied that the human interest value of the articles increased with the increase in the use of personal words and personal sentences.

Table 3: Inter correlation between Human Interest (HI) scores and two readability variables

Variables	HI scores	NPW	NPS
Human Interest scores (HI)	1.0000		
No. of personal words (NPW)	0.4145**	1.0000	
No. of personal sentences (NPS)	0.5264**	0.2983**	1.0000

** = Significant at 1% level of probability

Looking on to the values of 'r', it may be concluded that the use of personal sentence is more closely related to human interest value rather than the use of personal words.

Regression analysis of human interest scores with readability variables

Multiple correlation and multiple regression tests were conducted to find out the percentage of variation in human interest scores explained by the two readability variables. It was observed that the use of personal sentences contributed to an extent of 47 per cent while the use of personal words explained only about 17 per cent of variation (Table-4). These findings again demonstrated the importance of sentence factor in enhancing the readability, making it more interesting to the reader.

Table 4: Regression coefficient for personal words Personal sentences in case of Human Interest value

Variable	Reg. Coeff (b)	SE of Reg. Coeff (S.E.b)	't' value	'a'
Number of personal words	2.7495	0.4963	5.5405**	9.79
Number of personal sentences	2.0703	0.2749	7.5314**	31.82

R₁ = 0.6503

** Significant at 1% level of probability

Human interest formula

A readability formula for measuring the human interest value of the passages was developed by using the following formula:

$$Y = a + b_1 X_1 + b_2 X_2$$

Where

Y = Human interest value

A = constant

b₁ and b₂ are the estimates of regression coefficients

X₁ = Number of personal words per 100 words

X₂ = Number of personal sentences per 50 sentences

Making use of the data in Table-4, the following regression equation was fitted.

$$HI = 0.4109 + 2.4909X_1 + 7.2436X_2$$

For the purpose of applying the formula, the writer has to estimate the values of X₁ (No. of personal words per 100 words) and X₂ (No. of personal sentences per 50 sentences) and substitute them to arrive at human interest scores. These scores have to be used to judge the human interest value of the passages.

Categorization of H.I. scores

Based on the range, the H.I. scores were classified into four categories. The data was subjected to normality tests, by applying chi-square test. As the value of Chi-square was found to be non-significant, it was inferred that the distribution of the scores followed normality (Table-5).

Table 5: Observed and expected frequencies of Hi scores on four group classification

Name of category	Range of Hi scores	Observed Frequencies	Expected Frequencies
Dull	<40	33	29
Interesting	40-60	55	58
Very interesting	60-80	45	47
Dramatic	>80	17	16
Total		150	150

Hence, these four groups were therefore considered as standard and a nomenclature given as detailed in Table-6. The norms of distribution for personal words and personal sentences were also worked out and detailed in the same table.

Table 6: Norms of distribution of percentage of words and personal sentences for the four standard categories

Name of the Category	Personal Words/ 100 words		Personal sentences/ 50 sentences	
	Mean	Range	Mean	Range
Dull	14	10-20	6	2-10
Interesting	15	10-23	7	3-14
Very Interesting	17	11-21	8	4-17
Dramatic	20	17-28	11	7-22

Reliability and validity of the formula

Reliability:

An important criteria deciding the utility of any measuring device is the attainment of higher reliability or consistency of measurement. Two aspects of reliability are as follows:

- Can an analyst, analyzing the same sample at different times, agree with himself in his counts?
- Can two different analysts, analyzing the same sample, agree with each others counts?

Klare (1963) considered these aspects as analyst's reliability. These two aspects of reliability have been ensured in the present study by the following methods.

Test Re-test method:

In this method 15 selected reading passages used in development of readability formula, were administered to a group of 30 farmers in a village of Bangalore north taluk and the respondents requested to indicate the group to which it belongs on the continuum of human interest scale. Scores of 1 to 4 were given for respective categories of the scale from lowest to highest human interest.

The passages were administered to the same respondents again after a lapse of one month and the respondents were requested to grade the passages accordingly. The scores obtained by the judges at the two interval of time were correlated using Pearson's product-moment correlation. The value of r , which was 0.945, was significant at 1 per cent level of probability, which indicated the reliability of the formula developed.

Split-half method:

Consistency of the two different analysts in their judgement of the same material is the second aspect of reliability. To know the performance of the readability formula on this aspect, 40 farmers from another village in Bangalore north taluk were selected and divided into two equal groups. The 15 selected passages were distributed to these two groups of farmers and they were asked to indicate the level of human interest and scored accordingly. The scores obtained by the two groups of judges were correlated by using Pearson product-moment correlation. The computed value of r which was 0.965, was highly significant, thereby indicating the reliability of the reading ease formula.

Validity:

Validity refers to the property of the scale which ensures that the obtained test scores measure the variable that it is suppose to measure. In other words, it will ascertain whether a test will measure what it is intended to measure. The validity of the reading ease formula was ascertained using the following procedure.

Content validity:

The readability variables were selected based on the review of literature and discussion with the judges. Further, they were found significantly related to dependent variable, as revealed by the significant value of coefficient correlation. Hence, the present measuring device is ascertained to have content validity.

Directions for the use of formula

In order to ensure the use of the formula precisely, a set of guidelines and directions for the use of the formula have been developed and given below:

Selection of samples:

Take 100 words from about every tenth page in case of books. For articles, select two to three 100 words samples per 1000 words. Space these samples evenly. In case of passages running to 200-300 words, analyze the entire passage. Never begin or end a sample in the middle of a sentence.

Measurement of the variables:

The procedures involved in measurement of the readability variables have been explained in detail under methodology. A brief outline of the relevant aspects is as follows.

Counting of words

- Count all noun forms as one word. But participles or post fixes occurring in combination with nouns need not be counted as words.
- Count each word in a compound word. If the compound word is a name, it may be counted as a single word.
- All verbal forms are words. But modifications done to the verbs to give special meanings may not be counted as words. All adverbs should be counted as words.
- Adjectives should be counted except in cases where they do not have independent meanings. All sounds used to connect adjectives with nouns should also be counted.

Counting of sentences:

Count all units of writing separated by punctuation marks like periods, colons, semi colons, question marks, exclamatory marks, dashes and parentheses as sentence. Small headings, which do not have the quality of a sentence, are not considered for counting of sentence.

Calculation of Human Interest scores:

Find out the values of number of personal words and number of personal sentences and substitute the values in the H.I formula to arrive at the exact values. Alternatively, the readability chart could also be used to arrive at approximate human interest value of the passage.

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Training Needs of Extension Personnel on Wheat Production Technology

Vipan Kumar Rampal*, Kanwal Mahindra** and D.S. Ladher***

ABSTRACT

Centre of Excellence for Training in Wheat Production Technology is a leading institute and is responsible for organising national and state level training programmes on various aspect of wheat production technology. All the trainees of the training programmes organised by Centre of Excellence for Training in Wheat Production Technology during the period of one year, were the respondent. The training needs of the extension personnel were calculated by knowing the gap between the existing knowledge possessed by the extension personnel and that recommended by Punjab Agricultural University. The training need scores were stratified into three levels of training needs i.e. low, medium and high. These levels of training need indicated extent of training need. All the areas, sub-areas and items related to wheat production technology which fell into high and medium categories of training need were included in the curriculum for the training programmes.

Extension workers are like the nerve system in the process of development of rural people, the latter being the backbone of our nation. The extension personnel have been assigned the responsibility to educate the farmers to perform their activities efficiently. They can educate the farmers only if they are well equipped with the latest know-how about various aspects of crop production. Thus, the knowledge of extension personnel must be improved in order to enable them to play an effective role. The in-service training programmes are of utmost important to meet the growing needs of extension personnel. Regular in-service training is vital for providing continuous knowledge and to refresh the knowledge already gained. To impart latest know-how to the extension personnel about modern wheat production technologies, the Centre of Excellence for Training in Wheat Production Technology was established at Punjab Agricultural University, Ludhiana during the year 1989. It is a leading institution and is responsible for organising national and state level training programmes on various aspects of wheat production technology for extension personnel of the major growing states of India. To improve the training and make it need based it is necessary to study the training needs of extension personnel. The present paper seeks to examine the training needs with following objectives:

- To find out areas and sub-areas of wheat production technology in which extension personnel need training.
- To find out the extent of training needs.

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METHODOLOGY

The study was conducted at the Centre of Excellence for Training in Wheat Production Technology, Punjab Agricultural University, Ludhiana. All the trainees of the training programmes organised by the Centre of Excellence for Training in Wheat Production Technology during the period of one year, were the respondent. The total number of the respondents were 117. The training needs of the extension personnel were calculated by knowing the gap between the existing knowledge possessed by the extension personnel and that recommended by the Punjab Agricultural University. A knowledge test consisting of different areas, sub-areas and items on wheat production technology was framed with the help of literature and concerned resource person. The average knowledge score in respect of each area/sub-areas item was worked out by using the formula:

$$\text{Average Knowledge Score (out of 1.00)} = \frac{\text{Total knowledge score}}{\text{Number of items} \times \text{number of respondents}}$$

The maximum knowledge score that a respondent can get in an item was one. Thus, subtraction of knowledge score, about an item from one indicated training need score (INS) of the respondents in that item. The INS is a indicator of training need, thus training need were determined on the basis of mean training need scores (MTNSs) as under:

$$\text{MTNS of an item} = \frac{\text{Total TNS of the item}}{\text{No. of respondents}}$$

$$\text{MTNS of a sub-area} = \frac{\text{Total TNS of the sub-area}}{\text{No. of respondents} \times \text{No. of items in that area}}$$

$$\text{MTNS of an area} = \frac{\text{Total TNS of the area}}{\text{No. of respondents} \times \text{No. of items in that area}}$$

Based on the MTNSs of the items in different areas and sub-areas ranks were assigned. The top rank was accorded to that area/sub-area obtaining the maximum MTNS and lowest rank was given to that area/sub-area having minimum MTNS. Thus on the basis of ranks the training need hierarchy in the different area and sub-area was developed.

The training need scores were stratified into three levels of training needs e.g. low, medium and high by using cumulative frequency cube root method. These levels of training needs indicated extent of training needs i.e. a low level of training need indicated a low extent of training need and so on. Depending upon the value of training need score attained by each of the areas, sub-areas and items, these were grouped into three categories of extent of training need i.e. low, medium and high.

All the area, sub-area and items related to wheat production technology which fell into high and medium categories of training need were included in the curriculum for the training programmes organised by Centre of Excellence for Training in Wheat Production Technology.

RESULTS AND DISCUSSION

Knowledge of the Trainees Related to Wheat Production Technology

The scores of the respondents, obtained in the knowledge test, about wheat production technology were classified into three levels i.e. low, medium and high using cumulative frequency cube root method. It is evident from Table-I, that almost equal percentage of trainees fell into low and medium level of knowledge. Only 21.37 per cent of trainees had high level of knowledge. It showed that more than two-third of trainees exhibited low to medium level of knowledge. As the trainees are concerned directly with the transfer of technology related to wheat production technology to farmers, so their less knowledge about it demands a refreshment of their knowledge about the same.

Table 1: Distribution of the trainees according to their level of knowledge of wheat production technology

Knowledge Level	Knowledge Score	Respondents No.	%age
Low	0.000-0.488	47	40.17
Medium	0.489-0.630	45	38.46
High	0.631-1.000	25	21.37
Total		117	100

Training Needs in the Area and Sub-Area of Wheat Production Technology

The different areas and sub-areas of wheat production technology in which the trainees need training are discussed as under:

(i) Area of Wheat Production Technology

A perusal of Table 2, indicated that the first two ranks were recorded to the areas of 'Seed Production' and 'Insect Pests and Diseases' with mean training need scores as 0.724 and 0.517 respectively. It was concluded that the trainees needed more training in these areas. The next two areas related to wheat production technology which got ranks from three to four were, 'Deficiencies in Wheat' (MTNS=0.413) and 'Varieties' (MTNS=0.406). It indicated that the trainees need of training in these areas was moderate.

Table 2: Relative position of areas and sub-areas of wheat production technology in the training need hierarchy.

Area	Sub-areas	MTNS	Rank	Area Sub-areas
A. Seed Production		0.724	I	
	a) Isolation distance	0.894	I	
	b) Pest & Diseases	0.782	II	
	c) Fertilizers	0.641	III	
	d) Spacing	0.436	IV	
B. Insect Pests and Diseases		0.517	II	
	a) Diseases	0.573	I	
	b) Insect Pests	0.462	II	
C. Deficiencies in Wheat		0.413	III	
	a) Mineral deficiencies	0.413	I	
	b) Deficiencies	0.406	IV	
D. Varieties		0.462	I	
	a) Varieties of durum wheat	0.462	I	
	b) Varieties of rainfed wheat	0.351	II	
E. Agronomic Practices		0.308	V	
	a) Weed control	0.530	I	
	b) Seed treatment	0.373	II	
	c) Irrigations	0.312	III	
	d) Seed rate	0.197	IV	
	e) Sowing time	0.125	V	
F. Soil and Climate		0.230	VI	
	a) Soil	0.300	I	
	b) Climate	0.248	II	

The bottom two ranks were attained by the areas, on 'Agronomic Practices' and 'Soil and Climate', with mean training need scores of 0.308 and 0.109 respectively. It showed that the trainees had less deficiency in these area of wheat production technology and hence need less further training.

(ii) Sub-Area of Wheat Production Technology

Keeping in view the total amount of information included in main areas, these were further divided into sub-areas. The ranks were accorded to the sub-areas, on the basis of mean training need scores attained by them, under each of the main areas separately. These are explained as under:

(a) **Seed Production**:- It is evident from Table 2, that first and second ranks were accorded to the sub-areas, related to 'Isolation distance' (MTNS = 0.894) and 'Pest & Diseases' (MTNS = 0.782) which are comparatively more technical in nature. The next two sub-areas of training need in order of amount of knowledge gap, consisted of 'Fertilizers' (MTNS = 0.641) and 'Spacing' (MTNS = 0.436). It is concluded that the trainees had more training need in sub-areas related to 'Isolation distance', 'Pest & Diseases' and 'Fertilizers'. It is also observed that in the sub-areas on 'spacing' the trainees showed moderate training need.

(b) **Insect Pests and Diseases**:- It had two sub-areas. The sub-areas of 'Diseases' (MTNS = 0.573) got first rank whereas 'Insect Pest' (MTNS = 0.462) was placed in the second rank. Mean training need scores of these sub-areas showed that the trainees were deficient and hence need training in these sub-areas.

(c) **Deficiencies in Wheat**:- It had only one sub-area, 'Mineral deficiencies' (MTNS = 0.413). The trainees showed moderate training need.

(e) **Varieties**:- It was divided into two sub-areas. The sub-area related to 'Varieties of Durum Wheat' (MTNS = 0.426) got the first rank, whereas, second rank was accorded to 'Rainfed varieties' (MTNS = 0.351). It was inferred that trainees had more training need in former sub-area as compared to the latter.

(d) **Agronomic Practices**:- It is evident from Table-2, the first two sub-areas of training need hierarchy were related to 'Weed control' (MTNS = 0.530) and 'Seed treatment' (MTNS = 0.373). The next two sub-areas of training need in order of importance consisted of 'Irrigations' (MTNS = 0.312) and 'Seed rate' (MTNS = 0.197). The bottom sub-area of training need hierarchy referred to 'Sowing time' (MTNS = 0.125).

From the trend of the training need hierarchy it was apparent that the trainees possessed more training need in sub-area concerning 'Weed control'. A moderate training need was observed in sub-area related to 'Seed treatment'. The trainees showed less training need in sub-area about 'Irrigation'. It was also noticed that the trainees had low training need in 'Seed rate' and 'Sowing Time'.

(f) **Soil and Climate**:- The sub-areas related to 'Soil' (MTNS = 0.300) and 'Climate' (MTNS = 0.248) were awarded first and second ranks respectively. It is clear that the trainees had more training need in 'Soil' over the 'Climate', sub-area.

It is concluded that the trainees had high training need in the sub-areas of 'Isolation distance' and 'Pest & Diseases' related to 'Seed Production' whereas minimum training need was observed in the sub-areas on 'Irrigations' and 'Seed rate' related to 'Agronomic Practices' for Wheat Production Technology.

Extent of Training Need

In this section, the results pertaining to the distribution of the respondents according to their extent of training need in wheat production technology and the categorization of the areas, sub-areas and items into low, medium and high extent of training need have been reported.

i) Distribution of the Trainees According to their Extent of Training Need

It is inferred from Table 3, that majority of trainees (40.17%) had high extent of training need and less number of trainees (21.37%) had low extent of training need. The medium category of extent of training need, 38.46 per cent of trainees had fallen. It was further concluded that more than three fourth of the trainees (78.63%) had medium to high extent of training need whereas less than one fourth of the trainees (about 21 %) had shown low level of extent of training need. The findings are in line with those of Kaur (1985), Sandhu (1988).

Table 3: Distribution of the trainees according to their extent of training need based on knowledge test

Extent of training need	Training Need Score Range	Trainees No.	%age
Low	0.000-03.69	25	21.37
Medium	0.370-0.511	45	38.46
High	0.512-1.000	47	40.17
Total		117	100

ii) Categorization of Areas, Sub-areas and Items Based on Mean Training need Score Range into Low, Medium and High Extent of Training Need

The mean training need score ranged from 0.112 to 0.915. This range was further divided into three categories i.e. low, medium and high by using cumulative frequency cube root method. Based on the mean training need score range obtained by the areas, sub-areas and items, these were placed in low, medium and high extent of training need category. The data about this is presented in Table 4.

Table 4: Categorization of areas/sub-areas/items into low, medium and high extent of training needs based on the range of mean training need scores (MTNS)

Area	Sub-Area	Item	MTNS	Extent
A) Seed Production	a) Isolation distance		0.724	High
		(i) For loose smut susceptible variety	0.894	High
		(ii) To avoid cross pollination	0.915	High
	b) Pest & Disease		0.872	High
		(i) Control of Alternaria helminthosporium	0.782	High
		(ii) Control of Brown wheat mite	0.803	High
	c) Fertilizer		0.761	High
		(i) Dose of P_2O_5	0.641	High
		(ii) Dose of N	0.675	High
	d) Spacing	(i) Row spacing for seed production	0.607	High
B) Insect Pests & Diseases	a) Diseases		0.436	Medium
			0.517	High
		(i) Control of Karnal bunt	0.573	High
		(ii) Control of Powdery mildew	0.607	High
	b) Insect Pests		0.538	High
		(i) Control of Ear Cocker	0.462	Medium
C) Deficiencies in Wheat	a) Mineral deficiency		0.487	Medium
		(ii) Control of Terminate	0.436	Medium
			0.413	Wheat
		(i) Sulphur deficiency symptoms first appears on which leaves	0.413	Medium
		(ii) Zinc deficiency generally appears in which soil	0.655	High
		(iii) What are the Mn deficiency symptoms	0.419	Medium
D) Varieties	a) Durum Wheat		0.325	Medium
		(i) Variety of durum wheat having maximum yield	0.248	Low
		(ii) Variety of durum wheat recommended by P.A. U.	0.406	Medium
	b) Rainfed Wheat		0.462	Medium
		(i) Varieties grown on rainfed condition	0.521	High
		(ii) Varieties susceptible to Karnal bunt & loose smut disease	0.402	Medium
E) Agronomic Practices	a) Wheat Control		0.351	Low
		(i) Varieties grown on rainfed condition	0.368	Low
		(ii) Varieties susceptible to Karnal bunt & loose smut disease	0.333	Low
	b) Seed treatment		0.326	Low
		(i) Seed treatment in termite infested soil	0.530	High
		(ii) Seed treatment for control of loose smut	0.640	High
	c) Irrigations		0.573	High
		(i) Dose of leader (Sulfosulfuron)	0.376	Medium
		(ii) Control of Kandiali Palak	0.373	Medium
		(iii) Control of Phalaris minor resistant to Isoproturon	0.521	High

	(i)	Criteria for applying irrigation in durum wheat	0.410	Medium
	(ii)	Criteria for applying irrigation in Bread wheat	0.214	Low
d) Seedrate	(i)	Seed rate in durum wheat	0.197	Low
	(ii)	Seed rate in Bread wheat	0.248	Low
e) Sowing line	(i)	Sowing time of durum wheat	0.145	Low
	(ii)	Sowing time of Bread wheat	0.125	Low
F) Soil and Climate	(i)	Sowing time of durum wheat	0.137	Low
	(ii)	Sowing time of Bread wheat	0.112	Low
a) Soil			0.280	Low
	(i)	Type of soil required to grow durum wheat	0.300	Low
	(ii)	Type of soil required to grow Bread wheat	0.316	Low
b) Climate			0.274	Low
	(i)	Type of weather required at the time of sowing of wheat	0.248	Low
	(ii)		0.248	Low

(a) **Seed Production** :- In the area of 'Seed Production', the sub-areas related to 'Isolation distance', 'Pest and diseases' 'Fertilizers' and all the items included in these, were placed in high extent of training need. The other sub-area on 'Spacing' and one item concerning this, had fallen into medium extent of training need category. It was concluded that the trainees had high extent of training need in the first three sub-areas and all the items covered under these, whereas, they showed medium extent of training need in fourth sub-area and one item included under this.

(b) **Insect Pest and Diseases** :- It was found that the sub-area and items, covered under 'Diseases' had fallen in high extent of training need, whereas the sub-area and items covered under 'Insect Pests' were placed in the medium extent of training need. It showed that the level of training needs of the trainees was high to medium, in respect of 'Diseases' and 'Insect pests' and in all the items related to these sub areas.

(c) **Deficiencies in Wheat** :- A perusal of Table 4 showed that one item i.e. 'Sulphur deficiency symptoms', related to sub-area on 'Mineral deficiency' had fallen in the high extent of training need category. The next item i.e. 'Zinc deficiency' had fallen in medium category and other two items were placed in low category of training need. It was indicated that the trainees had high and medium training need extent, in first two items respectively and low extent of training need.

(d) **Varieties** :- The knowledge of respondents regarding 'Varieties of Durum Wheat' was found to be low except for item related to 'Varieties of durum recommended by P.A.U.', where it was moderate. It is interesting to note that sub-area on 'Varieties of rainfed wheat' had fallen in low extent of training need. It was observed that the trainees' extent of training need varied from

low to high in respect of the sub-areas and items included in this area.

(e) **Agronomic Practices** :- The area of 'Agronomic Practices' consisted of five sub-areas. It was interesting to note that the sub-area related to 'Weed control' was placed in high category of training need whereas the sub-area on 'Seed treatment' was put in the medium category of training need. All the remaining three sub-areas fell in the low extent of training need. The sub-area on 'Weed control' included three items, the first two items related to 'Dose of leader herbicide' and 'Control of khandali palak' fell in the high extent whereas third item was placed in medium category of the training need. The sub-area related to 'Irrigations' had two items, the first item related to 'Criteria of applying irrigation in durum wheat' fell in the medium extent of training need.

In the case of sub-area on 'Seed treatment' the item related to 'Seed treatment in termite infested soil' was placed in high category whereas item related to 'Seed treatment for control of loose smut' fell into low category of training need. It was also observed that the trainees required less training in the items included in the sub-areas on 'Seed rate' and 'Sowing time' as all these fell into low extent of training need.

(f) **Soil and Climate** :- It was observed that the trainees had low extent of training need in the sub-areas on 'Soil' and 'Climate' and in all the knowledge items included in these sub-areas. It showed that the trainees had more knowledge about these sub-areas.

iii) Curriculum for Trainees

The curriculum suggested for in-service training included all those areas/sub-areas/items of wheat production technology which fell into high and medium categories of extent of training

needs. The curriculum for the in-service training of the trainees included areas and sub-areas of wheat production technology related to 'Seed Production', Insect Pest and Diseases', 'Deficiencies in Wheat' and 'Varieties'.

CONCLUSION

The majority of the trainees exhibited low to medium level of knowledge regarding wheat production technology. The area of wheat production technology in which trainees were found to be deficient were related to 'Seed Production', Insect Pest and

Diseases', 'Deficiencies in Wheat' and 'Varieties' of wheat. More than three-fourth of the trainees showed medium to high level of training need in wheat production technology. The trainees had high training need in those areas of wheat production technology which are comparatively more complex and technical in nature. Thus, all those areas/sub-areas/items of wheat production technology which fell into high and medium categories of extent of training need should be included in curriculum for trainees in in-service training programme.

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Adoption of Improved Agricultural Technologies Among Tribal Farmers of Meghalaya

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ABSTRACT

Present study was conducted to assess the availability of improved agricultural technologies and their adoption among the tribal farmers of Meghalaya. Multistage random sampling was employed to draw the representative sample of the respondents. One district for each of three major tribes viz, Khasi, Garo and Jaintia was selected. For assessment of availability and adoption, number of recommended varieties, implements and agricultural chemicals (Paddy -15, maize-16 Ginger-3, vegetables-20, farm implements-15 & Agril chemicals-15) were collected after review of literature. Category wise maximum availability was found for agril chemicals (28.8%). Overall availability and adoption was found to be 53.9 and 24.7 respectively for all the tribes. Tribewise maximum availability of improved technologies was found among Khasi (64.7%) followed by Garo (50.8%) and Jaintia (46.2%). In case of adoption also it was maximum (27.5%) in Khasi followed by Jaintia (23.4%) and Garo (23.3%).

In spite of food self sufficiency in the country, a large population living in hilly and tribal areas do not have access to food (Rai, 2000). India as a country may be self sufficient but most of the States are still unable to produce sufficient foodgrain to meet their requirements. Meghalaya is one of them, where 80.33 per cent population comprises of Khasi, Garo and Jaintia tribes and jhooming is still a dominating cropping pattern, which is highly unscientific from the environmental and economic security point of view. To address the problem a number of research and extension agencies are involved in development and extension of location specific improved agricultural technologies. Present study was planned and conducted to know the status of technologies viz; its availability and adoption at the grass root level.

METHODOLOGY

Multistage random sampling was employed to draw the representative sample of the respondents and one district for each of three major tribes viz: Khasi, Garo and Jaintia. From each selected district, three blocks were selected and from each block two villages were selected and from each village 30 farmers were selected. For assessment of availability and adoption, six major categories (Paddy varieties, maize varieties, Ginger varieties, vegetable varieties, farm implements & agricultural chemicals) were made after thorough review of literature. Availability of recommended

improved technologies was seen at three levels viz; State Departments of Agriculture & Horticulture, local market and with the farmers.

Technological availability and adoption level were computed by using following formulae:

$$\text{Technology availability} = \frac{\text{No. of technologies available}}{\text{No. of technologies recommended}} \times 100$$

$$\text{Technology adoption} = \frac{\text{No. of technologies available}}{\text{No. of technologies recommended}} \times 100$$

RESULTS AND DISCUSSION

In case of paddy (Table-1) out of 15 recommended varieties 66.6 percent were available among Khasi tribes followed by Garo (53.3%) and Jaintia (40.0%) respectively while adoption had been 26.6 percent in case of Khasi and 20.0 percent each in case of Garo and Jaintia. Since, they grow paddy in low lying areas, variety should be hardy and fit for water logging conditions. In upland, generally they grow their own local varieties, which are early maturing which facilitates timely sowing of next crops viz; vegetables etc. having high market price during early days of the season.

Table 1: Availability and adoption of Paddy Varieties

Varieties recommended	Khasi Avail-ability	Khasi Adopt-ion	Garo Avail-ability	Garo Adopt-ion	Jaintia Avail-ability	Jaintia Adopt-ion
RCPL-1-28	X	--	--	--	--	--
RCPL-1-29	X	X	--	--	--	--
Megha Rice -1	X	--	--	--	--	--
Megha Rice -2	X	--	X	X	X	X
Ranjit	X	X	X	X	X	X
Bahadur	X	--	X	X	X	X
Pankaj	X	--	--	--	--	--
Mahsuri	X	--	X	X	--	--
Swarna Mahsuri (MTU-7029)	--	X	--	--	--	--
Pro-Agro-6201	X	X	--	X	--	--
IR - 36	--	--	X	X	--	--
IR - 64	X	--	X	--	--	--
Jaya	--	--	--	--	--	--
Pai Beemati	X	X	--	X	X	X
DR-92	--	--	--	--	--	--
Total	10	4	8	3	6	3
%	66.6	26.6	53.3	20.0	40.0	20.00

Out of 16 recommended maize varieties (Table-2) maximum (50.0%) were available among Garo followed by Khasi (43.7%) and Jaintia (37.5%), respectively. Adoption was found to be 18.8 percent each in case of Khasi and Garo, while in Jaintia it was only 12.5 percent. Overall, for all three tribes adoption was found to be very low (16.7%) because most of them were the Cob varieties and for that market was not available. Moreover, these varieties were also inferior in taste in comparison to their local varieties and preserved seeds of these varieties when sown for the second time, both vegetative growth as well as yield was not satisfactory.

Table 2: Availability and adoption of maize varieties

Varieties recommended	Khasi Avail-ability	Khasi Adopt-ion	Garo Avail-ability	Garo Adopt-ion	Jaintia Avail-ability	Jaintia Adopt-ion
NLD White	--	--	--	--	--	--
VL-43	X	--	--	--	--	--
Agri-76	--	--	--	--	--	--
MCU-314	--	--	--	--	--	--
Mimbangdung	--	--	--	--	--	--
Vijay	X	X	--	X	X	X
Kisan	X	--	X	--	--	--
Nayot	X	--	X	--	--	--
Ganga Safed-2	X	X	X	--	X	--
Ganga-5	X	--	X	X	X	--
Deccan-105	--	--	X	X	X	--
IMA-3	--	--	X	--	--	--
Pro-Agro-4642	--	--	X	X	--	--
Ganga-11	X	X	--	--	X	X
Sutain-1	--	--	--	--	--	--
Total	7	3	8	3	6	1
%	43.7	18.8	50.00	18.8	37.50	12.5

Availability average : 43.7 + 50.0 + 37.5 = 131.2/3 = 43.7%
Adoption average : 18.8 + 18.8 + 12.5 = 50.0/3 = 16.7%

In Ginger, one of the prominent commercial crop of the region, only three varieties were found to be recommended and out of these only one viz: Nadia was found available and adopted among all three tribes. But due to soft rot disease and very frequent fluctuations in its market prices, area under ginger is reducing drastically. Other two varieties viz: Poona and Suprabha were neither available nor adopted by the farmers due to its low market price. According to farmers, taste of these two varieties is inferior in comparison to Nadia. Overall availability and adoption was found to be 44.0 percent and 33.0 percent respectively (Table-3).

Table 3: Availability and adoption of ginger varieties

Varieties recommended	Khasi Avail-ability	Khasi Adopt-ion	Garo Avail-ability	Garo Adopt-ion	Jaintia Avail-ability	Jaintia Adopt-ion
Nadia	X	X	X	X	X	X
Poona	--	--	--	--	--	--
Suprabha	X	--	--	--	--	--
Total	2	1	1	1	1	1
%	66.6	33.3	33.3	33.3	33.3	33.3

Availability average : 66.6 + 33.3 + 33.3 = 133.2/3 = 44.4%
Adoption average : 33.3 + 33.3 + 33.3 = 99.9/3 = 33.3%

Among vegetables viz; tomato, cauliflower, cabbage, potato, beans and Capsicum out of twenty recommended varieties, availability was found to be 45.0, 35.0 and 40.0 Per cent respectively among Khasi, Garo and Jaintia tribes, while adoption was very low (only 20.0%, 15.0% and 15.0%). Overall availability and adoption was found to be 40.0 and 16.6 percent respectively.

Table 4: Availability and adoption of vegetable varieties.

Varieties recommended	Khasi Avail-ability	Khasi Adopt-ion	Garo Avail-ability	Garo Adopt-ion	Jaintia Avail-ability	Jaintia Adopt-ion
Tomato						
Rupali	X	X	X	X	X	X
Vishali	X	X	X	X	X	--
Sonali	C	--	--	--	--	--
Punjab Chbhara	--	--	--	--	--	--
Cauliflower						
Pusa Snowball	X	--	X	--	X	X
Pusa Deepali	--	--	--	--	--	--
Early Kunwari	--	--	--	--	X	--
K-1	--	--	--	--	--	--
Cabbage						
Pride of India	X	--	X	--	--	--
Golden Acre	X	--	--	--	X	--
Potato						
Kufri Shekhar	X	X	X	--	X	--
Kufri Lalima	X	--	X	--	--	--
Kufri Chipson-1	--	--	--	--	--	--
Kufri chipson-2	--	--	--	--	--	--
Kufri Badshah	--	--	--	--	--	--

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ASSESSMENT OF AVAILABILITY AND ADOPTION OF IMPROVED

Beans	-	-	-	-	-
SVM-1	-	-	-	-	-
Premier	X	-	-	-	-
Kentucky wonder	-	-	-	-	-
Capicum Chili	-	-	-	-	-
California Wonder	X	X	X	X	X
Total	9	4	7	3	8
%	45.0	20.0	35.0	15.0	40.0

Availability average : $45.0 + 35.0 + 40.0 = 120.0/3 = 40.0\%$
Adoption average : $20.0 + 15.0 + 50.0 = 85.0/3 = 28.3\%$

Availability and adoption of farm implements (Table-5) specially of those operated manually was found to be high 86.6 percent among Khasi 53.3 percent, among Garo and 46.6 percent among Jaintia while adoption was found to be 33.3, 26.6 and 33.3, percent respectively. Over all availability and adoption was found to be 62.1 and 31.0 per cent, respectively.

Table 5: Availability and adoption of Farm Implements:

Implements recommended	Khasi Availability	Garo Availability	Jaintia Availability
Engine operated grass Cutter	-	-	-
Adjustable rasi maker	X	X	-
Weeder with circular blade	X	-	-
Blade Hand Fork	-	-	-
Grass slasher	X	X	X
Dibble	X	X	X
Harrow	X	X	X
Sprayer	X	X	X
Maize Sheller	X	X	X
Paddy thresher	X	X	X
Power tiller	X	X	X
Wheel hoe drill	X	X	X
Light ridger plough	-	-	-
Fruit harvester	X	-	-
Mould board Plough	X	X	X
Total	13	8	7
%	86.6	53.3	46.6

Availability average : $86.6 + 53.3 + 46.6 = 186.5/3 = 62.1\%$
Adoption average : $33.3 + 26.6 + 33.3 = 93.2/3 = 31.0\%$

Out of 15 recommended agricultural chemicals (Table-6) availability was found to be high, i.e. 80 percent each in Khasi, Garo and Jaintia tribes while adoption was maximum in Khasi 33.3 percent followed by Garo and Jaintia 26.6 percent each. Overall availability and adoption was found to be 80.0, percent and 28.8, percent respectively for all agricultural chemicals. Hence adoption is very low in comparison to availability because of its high price and the low purchasing power of the farmers. Chemicals mostly used by the farmers were urea, DAP, MOP in all the crops while Dithane M-45, Bavistin and Chlorophyris for pre-sowing treatment of ginger rhizome, spraying with Deltamethrin .003 per cent or monocrotophos 0.05 per cent or endosulphan 0.07 per cent in paddy for foliage pests like rice hispa, ear cutting caterpillar, roller, gundhibug etc, and spray with 0.05 per cent malathion or 0.07 per cent endosulphan at the time of flowering for tomato fruit borer.

A perusal of Table-7 reveal that technology availability has been maximum (64.7 per cent) for Khasi tribe followed by Garo (50.8 per cent) and Jaintia (46.2 per cent). Adoption of technologies has also been maximum (23.3 per cent) among Khasi followed by Jaintia (23.4 per cent) and Garo (23.3 per cent).

Table 6: Availability and adoption of agricultural chemicals

agricultural chemicals recommended	Khasi Availability	Garo Availability	Jaintia Availability
Urea, DAP & Murate of X Potash	X	X	X
Rice blast	-	-	-
See Soaking for 12 hrs. X in 0.1% Bavistin 50 WP Solution	X	X	X
Seedling root dip treatment for 12 hrs in 0.1% solution of Fuzi-1 or Bavistin 50 WP Solution	X	X	X
Foliar Spray of Bavistin X (0.1%) followed by Dithane M-45 (0.25%) - Spray fortnightly both in upland and lowland. A sticker (Sandovit @ 0.1%) may be mixed in the spray solution	X	X	X
Soft rot of ginger	-	-	-
Presowing rhizome treatment with mixture of Bavistin @ 1 g/l with Dithane M-45 @ 2.5 g/l and chlorophyris @ 1 ml/l for 30 minutes. Monthly Dithane M-45 or Bordeaux mixture (1%)	X	X	X
Insect pest of paddy	X	X	X
Soil incorporation of carbosulfan 3G @ 1 Kg a.i./ha at last puddling for controlling-WBPH, whorl maggot, BPH, stem borers, rice stem fly, rice root aphid and gallmidge	X	X	X
Spraying with Deltamethrin 0.003% or 0.05% monocrotophos or endosulphan 0.07% for foliage pests like rice hispa, ear cutting caterpillar, leaf roller and gundhibug	X	X	X
Insect pest of maize	-	-	-
For Termites - chlorpyrifos 2% dust to be applied around the plants and mixed in soil @ 20 Kg/ha	X	X	X

ADOPTION OF IMPROVED TECHNOLOGIES

Table 7: Availability and adoption of improved agricultural technologies among Khasi, Garo and Jaintia tribes

Components	Khasi Availability	Garo Availability	Jaintia Availability
Paddy	66.6	26.6	53.3
Maize	43.7	18.8	50.0
Ginger	66.6	33.3	33.3
Vegetables	45.0	20.0	35.0
Farm Implements	86.0	33.3	53.3
Agril. Chemical	80.0	33.3	80.0
Average	64.7	31.3	50.8

The overall availability (Table-8) of improved agricultural technologies has been only 53.9 percent and adoption only 24.7 percent for all three tribes, viz. Khasi, Garo and Jaintia. It clearly indicates that more efforts have to be made towards infrastructure development and the development of variety of technologies. At the same time, development departments have to shoulder the responsibility of taking it up to the ultimate users in remote to remotest places in the hills and to upgrade the awareness of the farmers by demonstrating the production potential as well as economic viability of the latest technologies.

For term borer - carbosulfan or phorate granules @ 10-20 grammes/whorl. 25-30 days after sowing	-	X	-	X	-
Vegetables	-	-	-	-	-
Cutworms and soil pests - spray 2% dust @ 5-10gms per sq at the time of transplanting	X	-	X	-	-
Foliage pests - spray with malathion 0.05% or endosulphan 0.07% or Yentrodion 0.05% or Dimite 0.05%	X	-	X	-	X
Tomato fruit borer - spray with 0.05% Malathion or 0.07% endosulphan at the time of flowering at 15 days interval	X	-	X	-	X
Chilies-Fruit fly, Jassids and aphids - spray endosulphan @ 0.05% or malathion @ 0.05% at the time of incidence.	X	X	X	X	X
Ginger-Stem borer - Soil application of carbosulfan 3G @ 1 Kg a.i./ha foliage pest-spray with monocrotophos 0.05%	X	-	X	-	X
Total	12	5	12	4	12
%	80.0	33.3	80.0	26.6	80.0

Availability average : $80.0 + 80.0 + 80.0 = 240.0/3 = 80.0$
Adoption average : $33.3 + 26.6 + 26.6 = 86.5/3 = 28.8\%$

Table 8: Availability and adoption of Improved Agricultural Technologies in Meghalaya

Particulars	Paddy	Maize	Ginger	Vegetables	Farm Implements	Agril. Chemicals	Overall Average
Availability	53.3	43.7	44.4	40.0	62.1	80.0	53.9
Adoption	22.2	16.7	33.3	16.6	31.0	28.8	27.7

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Effect of Mass Media on Knowledge Gain

R. P. Singh 'Ratan', S. K. Topno, R. K. Topno, R.K. Singh and Niva Bara*

In tribal areas of Bihar many Government and non-government agencies are engaged in bringing about socio-economic changes among tribal farm women in which communication media is playing a greater role. However, their reach is still limited to remote areas. In such areas which are situated in and around the industrial and educational settings, the traditional life style and knowledge about agricultural activities is slowly undergoing change. Earlier their knowledge about agricultural activities was 'very low due to negligible exposure to the outside world and mass media. However, in the recent past many forces have started operating in the villages affecting their agricultural activities and knowledge. Keeping this fact under consideration the study was undertaken to estimate the gain in knowledge. Keeping this fact under consideration the study was undertaken to estimate the gain in knowledge of tribal farm women on rice production technologies.

METHODOLOGY

The study was conducted in Ranchi district of tribal dominated plateau region of Bihar. Four blocks of Ranchi district, namely, Kanke, Namkum, Angara and Ratu were selected. Four villages, one from each block were selected using random sampling method i.e. Nagri, Plandiu, Cheldagoso and Herser. From each village, 25 tribal families were selected using the probability proportionate to size (PPS) method. From each selected farm family one female member was selected as a respondent by simple random sampling method. Thus the sample consisted of 100 respondents. Life style of tribal farm women was studied through Likert type

scale developed by Schwartz (1981) with certain modifications. The respondents were classified into three life style categories i.e. modern, semi-modern and traditional type of life style. A well structured and pre-tested interview schedule was used for data collection. The data were collected through personally interviewing the respondents.

The impact of mass media on gain in knowledge of tribal farm women was measured with the help of a schedule developed eloped for the purpose. The respondents were asked to indicate whether they were acquainted with 28 selected knowledge items about package of practices of improved rice production. Simultaneously, they were asked through recall method to indicate whether the items were known to them prior to their use of mass media or not. In case of positive response the respondents were asked to indicate from which medium they became able to know about the items.

RESULTS AND DISCUSSION

Impact of mass media on gain in knowledge

The data in Table 1 show that all the respondents belonging to modern life style group were using all the four media of communication i.e. radio, television, film media and newspapers, whereas majority of tribal farm women of semi-modern type of life style were using radio, television and film (about 90%) and majority of tribal farm women having traditional type of life style were non users of the mass media except radio.

The data pertaining to gain in knowledge about the six components of rice production technology viz., variety, nursery

management, transplanting, fertilizer application, plant protection and harvesting have been presented in Table-2. A significant gain in knowledge among the tribal farm women of modern life style were observed with respect to the three components of improved rice production i.e. varieties, nursery management and transplanting. The respective 't' values (t = 2.84, 3.15 and 5.54) were found to be significant at 1 per cent level which indicated that there were significant gains in their knowledge due to use of various mass media by tribal farm women of modern life style about the three components of improved rice production technology. The data pertaining to gain in knowledge in respect of respondents belonging to semi-modern type of life style indicated that significant gains were

observed with respect to four components of package of practices i.e. varieties, nursery management, transplanting and plant protection measures. The respective values of 't' (t = 3.35, 3.84, 4.18 and 3.27) were significant at 1 per cent level which indicated that use of mass media had a greater impact on gain in knowledge among the respondents of semi-modern type of life style on the four components of improved rice production. About fertilizer application and harvesting, the gain in knowledge in both the categories of respondents were found to be non-significant. A very sad picture emerged with respect to tribal farm women of traditional life style as gain in knowledge was recorded only in varieties and transplanting and that too was not significant.

Table 2 : Impact of mass media on gain in knowledge of the tribal farm women about various components of package of practices of improved rice production

Components of Package of practices	Modern (N=14)			Semi-Modern (N=65)			Traditional (N=10)		
	After	Before	Gain 't' value	After	Before	Gain 't' value	After	Before	Gain 't' value
Rice Variety (5)	3.00	2.36	0.64 2.84	2.11	1.93	0.18 3.55**	1.25	1.19	0.06 1.0 N.S.
Nursery management (7)	1.93	1.50	0.43 3.15**	1.46	1.29	0.17 3.84**	0.44	0.44	- -
Transplanting (6)	2.43	1.29	1.14 5.54**	1.70	1.47	0.23 4.18**	0.94	0.81	0.13 1.43 N.S.
Fertilizer Application (4)	0.28	0.14	0.14 1.44 N.S	0.03	0.03	- -	- -	- -	- -
Plant Protection (8)	2.71	2.36	0.35 2.10 N.S	2.27	2.09	0.18 3.27**	0.56	0.56	- -
Harvesting (2)	1.21	1.21	- -	0.67	0.63	0.04 1.29	0.44	0.44	- -

Figures in parentheses indicate maximum obtainable score with respect to each component

* Significant at 1 per cent level / N.S. - None Significant.

The data on mean knowledge scores presented in Table 2 indicated that the respondents of all the life styles had poor level of knowledge (below average) about various components of package of practices of rice production except about the varieties. The respondents belonging to modern/semi-modern life styles received significant gains in their knowledge about four components of package of practices of improved rice production i.e. varieties, nursery management, transplanting and plant protection measures due to use of various tools of mass media. Regarding fertilizer application and harvesting gain in knowledge was found to be either nil or non-significant. The respondents belonging to traditional type of life style did not

receive any gain in their knowledge about all the components of package of practices of improved rice production due to less use of mass media and poor economic condition. Traditional type of farm women have very poor risk bearing capacity and behave like laggards. Similar findings have also been reported by Chali (1972) and Prasad (1988).

CONCLUSION

Significant gains in knowledge about some of improved rice production technologies were recorded only in case of modern and semi-modern tribal farm women whereas, traditional women are deprived of it. Therefore, programmes on farm and home improvement need to be designed in a compatible mode, keeping in view the local language and level of understanding of tribal farm women.

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Table 1 : Frequency distribution of respondents according to their use of various mass media

	Modern (N=14)		Semi-Modern (N=70)		Traditional (N=16)		Total (N=100)	
	User	Non-user	User	Non-user	User	Non-user	User	Non-user
Radio	14 (100.00)	-	65 (92.86)(7.14)	5	10 (62.5) (37.5)	6	89	11
Television	14 (100.00)	-	63 (90.00) (10.00)	7	7 (43.75) (56.25)	9	84	16
Print media	14 (100.00)	-	39 (55.71)(44.29)	31	3 (18.75) (81.25)	43	56	44
Film	14 (100.00)	-	64 (91.43)(8.57)	6	7 (43.75) (56.25)	9	85	15

Figures in parentheses indicate percentages.

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Involvement of Women in Common Carp Breeding

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Women have been involved in fishery related activities from time immemorial however, their contribution often go unnoticed. De and Saha (2005) have called for attention to the issues of absence of specific government strategy to address gender roles in fishery, poor extension linkage, inadequate recognition of women in fisheries etc.

Aquaculture is the emerging sector where women can benefit from the technologies leading to their empowerment and contribution to the development of fisheries. It is also an established fact that money going through a woman in a household brings more benefits than money going to a man (Begum, 1995). Rural women are engaged in a host of activities in the culture practices contributing to the production systems (Bhanot *et al.* 1999). They include aquatic weed management and culture of commercially important macrophytes like makhana (*Euryale ferox*), Singhada (*Trapa Bispinosa*), control of predatory and weed fish, pond fertilization, brood stock management, fish breeding, seed rearing, composite carp culture and integrated fish farming. The present study was undertaken to assess the extent of involvement of women in common carp breeding programme under Institute Village Linkage Programme (IVLP).

METHODOLOGY

The study was conducted in eight villages located at 10 Km. radius from CIFA, Bhubaneswar during the year 2001-2004. Five women self help groups were formed with the support of local leaders. Training was imparted in all aspects of common carp breeding both in the Institute as well as in the pond site.

Common carp (*Cyprinus carpio*) are prolific breeder and can be bred throughout the year with peak in the month of January-March and July-August. Brood stock of common carp were procured from the composite fish culture pond of the respective village. Brood were provided with optimum brood fish management and care for one month feeding groundnut oilcake, rice bran, soya meal in equal proportion and supplemented with vitamins and

mineral mixture by feeding at the rate of two per cent of the biomass. The maturity status of the brood were checked every fortnightly with active involvement of women.

Female brood were induced with ovaprim at the rate of 0.2 ml/Kg body weight. As the males were in prime condition and in milting stage they were not induced. Initially 1:2 male to female ratio was proposed and gradually replaced to 1:1 of same weight group during assessment and refinement process and with gradual experience gain. Different natural and artificial egg collectors like water hyacinth, hydrilla and strands of plastic ropes were assessed for their breeding efficiency.

RESULTS AND DISCUSSION

Assessment and refinement of common carp breeding

Table 1 : On-farm trial of common carp breeding with different egg collectors

Year	Type	No. of Five sets	Five sets Female weight (kg)	Female weight (kg)	Male weight (kg)	Male:Female ratio	Male period (hr)	Female period (hr)	Spawning (Lakh)	Nature of Incubator	% of Spawns	Net Benefit	
Year	Type	No. of Five sets	Five sets Female weight (kg)	Female weight (kg)	Male weight (kg)	Male:Female ratio	Male period (hr)	Female period (hr)	Spawning (Lakh)	Nature of Incubator	% of Spawns	Net Benefit	
2002	OFT	5	1870±112	1260±99	1.2	1.5	6.5	Water hyacinth	68	40	2.5	330	0.7
2003	OFT	5	1900±125	1300±75	1.2	1.5	8.0	Plastic	62	80	6.4	228	2.1
2004	OFT	5	1920±140	1320±80	1.1	1.0	9.5	nylon rope strands	60	85	8.0	1190	5.3

WSHG: Women Self Help Group; OFT: On-Farm Trials

The self help groups in the year 2002 started the breeding programme with female: male ratio of 1:2 and 6.3 lakh spawned eggs were obtained and were incubated under controlled condition with water hyacinth as egg collector. The hatching rate obtained was 40 per cent. Finally an average of 2.5 lakh

spawn was recorded per five sets of brood fish (Table-1). In the year 2003 further refinement of the technology was done by replacing water hyacinth as the egg collector with strands of polyethylene gunny bags made as bundles. This intervention helped the farmers to get an average 6.4 lakh spawn with hatching rate of 80 per cent. Since the thread from the plastic gunny bags do not utilize the dissolved oxygen of the pond and they do not pollute the confined water inside hapa.

During the subsequent year 2004, further refinement was made with the male: female ratio reduced to 1:1 of same weight group and providing hormonal induction to male and female both and using fine nylon rope strands as egg collector. An average of 8.0 lakh spawn were produced per five sets of brood fish with 85 per cent hatching rate.

It is evident from Table-1 that water hyacinth as egg collector has resulted in a poor hatching rate of 40 per cent. In subsequent trials when the egg collectors were replaced with polythene bag strand and nylon rope strand the hatching rate improved to 80 per cent and 85 per cent reason could be that water hyacinth consumes oxygen and also pollutes water inside hatching hapa. Cost benefit ratio were calculated for each practice. An impressive C:B of 3.3 were arrived at when both male and female were induced and nylon rope strand used as egg collector

Impact on women

Common carp breeding has resulted in active involvement of women in fisheries. This has opened a new avenue for additional income generation. This has enabled women SHGs gain confidence in themselves. Net income earned by each SHG was Rs.1190 in three weeks of time. The same breeding if carried out thrice during the season (subject to availability of brood) this will translate into a net income in the range of Rs.4000 in 2-3 months time. It is heartening to note that

encouraged by the success of common carp breeding few self help Groups has started breeding other Indian Major Carps too. Raising seasonal vegetables in the pond embankment is also gaining popularity among these women. This would go a long way in making Orissa self sufficient in fish seed production. The authors argue that such simple low cost technologies may be spread to other similar areas for adoption by women.

The observation is in conformity with other international studies from Bangladesh and Mozambique. None of these women were involved in fishing/aquaculture prior to the project. Today these ponds are their primary or only source of income. In addition to fish culture in ponds cultivation of vegetables on dikes indicated their enthusiasm in managing their resources. The small ponds are viably functioning under group ownership and management (Nathan *et al.* 1997). Women members, especially household heads seem to be most enthusiastic in receiving the technology which was similarly observed in an aquaculture extension case of Mozambique (Noel, 1996).

CONCLUSION

It is essential to increase the participation of women in training and explore ways to enhance their knowledge through various ways in accordance to their level of literacy. Gender study itself is a complex one as only part of it can be observed outside the household and a large amount of gender dynamics takes place within the four walls, making it extremely difficult to be understood within a short period of time. Due recognition must be given to women who are contributing enormously towards fisheries. It is also important that they gain autonomy in decision making with regard to activities they carry out. It is time that we seek to realise the full potential of farm women, mainstream them in development activities and provide all support and strength for enhanced productivity.

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Adoption of Drip Irrigation System

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Drip irrigation more popular all over the country, due its efficiency can use optimum or little quantity of irrigation water for crop production. Several results of research established that about 40 to 60 per cent of available water could be saved by adopting drip irrigation. In India, 33 per cent (83 million ha) area is under irrigation out of total cropped area (237 million ha). In Maharashtra out of 21.1 million hectares cultivated area only 15.4 per cent area (3.3 million ha) is under irrigation. It is clear that use of advanced technique like drip irrigation has become a vital aspect of development programme in irrigation. Water management technology is the positive answer to increase agriculture production. It is proved that an availability of irrigation water for agricultural and its management in scientific way helps to increase the agriculture production by many folds.

It is therefore essential to adopt improved water management practices along with concerned technology for increasing the yields of crops. The present investigation was undertaken in Malshiras Tehsil of Solapur district of Maharashtra with following specific objectives.

1. To study the different socio-economic aspects of drip irrigators.
2. To study the adoption of different techniques of drip irrigation system in project area.
3. To study the relationship of personal, socio-economic and psychological variables of respondents with their knowledge of drip irrigation system.

METHODOLOGY

The study was conducted in Malshiras tehsil of Maharashtra state. The ten villages were selected from Malshiras tehsil considering the availability of drip irrigation sets. List of villages and farmers having drip irrigation sets in working condition were obtained from the office of Malshiras

Panchayat Samiti and from dealers. Randomly ten villages and hundred respondents were selected. A specially designed interview schedule was used as an instrument of data collection in personal interview with respondents.

In order to get an overall picture of adoption of recommended management and maintenance practices of drip irrigation system by the farmers, the adoption score was calculated. The respondents were asked to state whether they adopted the same or otherwise. Score two for the 'full adoption' of the practice, score one for 'partial adoption' and score zero was assigned for 'non-adoption' of the practice. The data was subjected to statistical tests such as frequencies, percentages, coefficient of correlation and multiple regression for drawing inferences.

RESULTS AND DISCUSSION

Personal, socio-economic, psychological characteristics of drip irrigators.

The study (Table 1) pointed out that most of the drip adopters had (40.00 per cent) secondary education and majority of drip adopters (66.00 per cent) had medium land holding while two third of respondents (61.00 per cent) had medium level of income. It was observed that over two third of the respondents belonged to medium level of socio-economic status. Majority of the respondents (60.00 per cent) had medium level of risk orientation category. However, two third of respondents (65.00 per cent) had medium level of scientific orientation. Fifty five per cent drip adopters had medium hectares of area under drip. Regarding the other characteristics, it is seen that progressive farmers (52.00 per cent) were major motivators for adoption of drip irrigation followed by rich (42.00 per cent). It can be concluded from the data that medium educated farmers had medium socio-economic status and procured information from progressive farmers.

Table 1: Distribution of respondents according to personal, social and economic characteristics.

Attributes	Frequency	Percentage
I Personal characteristics		
A. Education		
Illiterate	6	6
Primary Education (up to 4th)	12	12
Secondary Education (5th to 10th)	40	40
Higher education (11, 12th)	20	20
College (12th and above)	22	22
II Socioeconomic characteristics		
A. Size of land holding		
Small land holding (up to 2ha)	6	6
Medium land holding (2ha to 4ha)	66	66
Large land holding (above 4ha)	28	28
B. Annual income		
Low (up to 65000)	23	23
Medium (65001 to 95000)	61	61
High (above 95000)	16	16
C. Socio-economic status		
Low (Score up to 24)	22	22
Medium (Score 30 to 24)	65	65
High (Score above 42)	13	13
III Psychological characteristics		
A. Risk Orientation		
Low (Score Up to 7)	17	17
Medium (Score 8 - 11)	65	65
High (Score above 11)	18	18
B. Scientific orientation		
Low (Score Up to 21)	20	20
Medium (Score 22 - 27)	65	65
High (Score above 27)	15	15
IV Situation characteristics		
A. Area under drip		
Small (Up to 5 ha)	36	36
Medium (0.6ha to 10ha)	55	55
Large (Above 10 ha)	9	9

Adoption level of drip irrigators

The data in Table-2 reveal that more than half of the drip adopters (55.00 per cent) had medium level of adoption of recommended practices related to drip irrigation system followed by one fourth of the respondents (26.00 per cent) who had low level of adoption and 19.00 per cent had high level of adoption. It can be said that most of the respondents had medium level of adoption. The practices were new for some of the respondents who might have had fear about adoption of all the recommended practices of drip system.

Table 2: Distribution of drip adopters by their level of adoption of recommended practices.

Level of Adoption	Frequency	Percent
Low score up to 26	26	26.00
Medium- (Score between 27-36)	55	55.00
High (Score above 36)	19	19.00
Total	100	100

Relationship between personal attributes and adopters and adoption of drip systems.

The study revealed that among the selected independent variables, five variables viz. education, size of land holding, annual income, socio-economic status, scientific orientation and risk orientation were observed to be positively and significantly related to adoption.

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Constraints Experienced by the Homegarden Farmers of Kerala

Allan Thomas*, S. Bhaskaran** and S. Raju***

RESULTS AND DISCUSSIONS

Table 1: Constraints experienced by homegarden farmers

Constraints	Rank means	Rank over class	Rank over total
A. Marketing constraints			
Surplus but insufficient for marketing	79.12	1	1
Low price of produce	77.00	2	2
Lack of markets for products of homegarden	71.50	3	4
B. Economic constraints			
High labour cost	75.37	1	3
Prohibitive cost of inputs	53.37	2	11
Non-availability of credit	47.12	3	15
C. Personal constraints			
Lack of extension service and assistance	70.37	1	5
Inadequacy of capital	62.62	2	6
Poor economic status of homegarden farmers	61.75	3	7
Lack of knowledge about technology	60.00	4	9
Lack of motivational factors	46.75	5	14
Lack of time in homegarden activity	45.37	6	17
Lack of knowledge in post harvest handling	44.50	7	19
D. Physical constraints			
Non-availability of supplies and services	60.62	1	8
Non-availability of labour	57.25	2	10
Uneconomic holdings	44.87	3	18
Poor transportation facilities	42.00	4	20
Interrupted power supply	26.00	5	25
Scarcity of quality irrigation water	25.25	6	26
Non-availability of implements	36.25	7	23
E. Technological constraints			
Lack of homegarden suited implements	52.37	1	12
Lack of technology suited for homegarden	51.25	2	13
Poor storage facilities	50.50	3	14
Lack of processing implements	41.50	4	21
Lack of post harvest implements	37.87	5	22
F Political constraints			
Trade unionism	35.37	1	24

A perusal of Table 1 shows that the most important constraint faced by the homegarden farmers was "surplus but insufficient for marketing" which is on par with low price of produce, high labour cost, lack of markets for products of homegarden. The other constraints were lack of extension service, inadequacy of capital, poor economic status of homegarden farmers, non-availability of supply and services.

METHODOLOGY

Based on discussion with farmers, scientists, experts in agriculture and also through relevant review of literature, some of the constraints faced by homestead farmers were identified. A list containing twenty-six constraints was included in the final interview schedule. The list was open ended by which the constraints experienced by the homegarden farmers at the time interview were added.

The response to each constraints was obtained in a four-point continuum namely, most important, important, less important and least important, with the score 'four', 'three', 'two' and 'one' respectively. Mean rank cumulative index for each constraint was worked out and the constraints were ranked and catalogued under different subheads.

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lack of knowledge about technology, non-availability of labour, prohibitive cost of inputs, lack of homegarden suited implements, lack of technology available for homegarden, poor storage facilities for homegarden produce, non-availability of credits, lack of motivational factors, lack of time on homegarden activities, uneconomic holding, lack of knowledge in post harvest handling, poor transportation facilities, lack of processing implements and lack of post harvest implements. The constraints that were of least importance for the home garden farmers were lack of quality irrigation water followed by interrupted power supply, trade unionism and lastly the non-availability of implements.

Many constraints were reported by the homegarden farmers, of which 'surplus produce but insufficient for marketing' was recorded as the most important constraint closely followed by the low price of produce, high labour cost and lack of market for homegarden products. The very low holding size and variety of products from the unit of homegarden makes it difficult for the homegarden farmers to find markets for the produce obtained from homegarden. Suitable strategies and plans are necessary for evolving a permanent market for homegarden produce from the part of the concerned authorities. The initiating of cooperatives or self-help groups can be thought of in homegarden situation for collection and marketing of the produce as it has much better potential.

The low price of the homegarden produce was of course natural as the marketing was done for only the surplus of the produce.

Non-availability of labour has a influence on high labour cost in the homegarden. The political and social situations prevailing in the state with respect to the work culture also point to the cause of high labour cost. Even though family labour is highly involved, some physical labour requirement for operations like land preparation, harvesting of produces from coconut, arecanut and other tree crops necessitates the involvement of skilled labour and hence the homegarden farmers are forced to pay high wages for the labour. The results

were in accordance with the findings reported by Aravind (1999) and Geethakutty (1993).

Lack of extension services and assistance, poor economic status of farmer and lack of knowledge about technology were also perceived to be important by homegarden farmers. The prospect of homegarden even though high, has not touched the hearts of the homegarden farmers. This was because the extension service and assistance had not reached the homegarden farmers, which resulted in neglect of the homegarden. The lack of extensions service could be attributed a less number of staff for an area or the work culture prevailing in the place or state. Furthermore inadequacy of capital, supplies and services and uneconomic holdings especially for Alappuzha district added to the grievance of homegarden farmers. Many of the homegarden farmers were of the view that with adequate support in terms of extension services and technology awareness they were willing to take up any enterprise as it eventually helped them in income generation activity. Better family involvement is also assured which will further help to get more cooperation and co-ordination among the different members of the house hold which will enable the member of homegarden to have a happy life in terms of better understanding and active involvement in activities of home. Extension service or support system thus should be reoriented to the homegarden situation as it constitutes the majority or bulk of the Kerala land area.

CONCLUSION

The constraint analysis revealed that the major constraints identified were 'surplus but insufficient produce for markets which was on par with, low price of produce, high labour cost, lack of markets for homegarden products and lack of extension service. Identifying the constraints faced by homegarden farmers will serve as a useful feedback to the research system for designing technologies useful to the small and marginal farmers for large scale recommendation so as to share the benefits of development. It will aid in technology change and improvement in any sphere, increase economic returns and enhance development process of the state.

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Pattern of Decision Making Among Tribal Households

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In India livestock plays a multi-faceted role in providing draught power for the farm, manure for crops, energy for cooking and food for household consumption as well as the market. For the tribal households, dairying is one of the most important and economically viable occupations, which provides a source of income to sustain their livelihood. As far as the market facilities are concerned, they are very limited in the tribal habitation. The tribal women are active and agile in different agricultural activities and extend a considerable economic support for family. Depending upon the economic status, women perform multifarious role in the field of dairying. Though women play a significant role in livestock management and production, women's control over livestock and its production is negligible. Women generally have different types of responsibility in livestock rearing such as ownership, control over decision-making, use right and provision of labor. In most system, women provide labour for the various tasks related to livestock but may or may not control the process of decision-making, particularly over the disposal of animals and animal products.

Their participation in decision-making may vary from very simple routine type to a complex and difficult job. Dairy farming is an integral part of these tribal economies. Decision-making is one of the key activities in tribal households in which the family members engage in the making of decisions. It involves the process of consciously choosing courses of action from available alternatives and integrating them for the purpose of achieving the desired goal. As agriculture is the backbone of our national economy, along with meeting the food needs of our consistently growing human population, it becomes imperative to know the pattern of decision making in the tribal household in marketing activities of dairy farming.

METHODOLOGY

The study was carried out in Nilgiris district of Tamilnadu state taking into account the six major tribes namely Kotas, Todas, Irulas, Paniyas, Kurumbas and Kattunaickas.

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Todas, Irulas, Paniyas, Kurumbas and Kattunaickas. A total of 18 tribes habitations were selected for the study at the rate of three habitations (having maximum population of particular tribe) for each tribe. A sample of 17 households was selected. Thus a total sample of 306 tribal household for the above six tribes was studied. The head male and head female of each household was interviewed personally through a pre-structured well-structured interview schedule. An attempt was made to find out the pattern of decision making ability of the tribal households in marketing activities of dairy farming. The decision-making ability of the respondents was studied through the scale of Satyajit Roy (1998) after making necessary modifications.

RESULTS AND DISCUSSION

Decision making pattern of tribal households in marketing activities

The pattern of overall decision-making regarding marketing activities of dairy farming among different categories of tribal household have been presented in Table 1 which clearly reflects that the decisions were made by husband (51.63%) followed by collectively (31.37%), wives (13.40%) and any other (3.60%). The husband took the decisions with largest percentage in practices like selling and buying of animals (68.62%), selling of milk and milk products (68.33%) and utilization of cow dung (79.74%).

As far as the involvement of the collective decisions is concerned, they exhibited their majority in keeping the account of milk and milk products sold (39.54%) and availing credit (80.06%). The Table 1 further indicates the participation of wives in decision making related to marketing activities of dairy farming which were selling and buying of animals (68.62%), keeping the account of milk and milk products sold (68.33%), selling of milk and milk product (3.60%).

It was observed that the participation of any other in decision-making was almost negligible i.e. none were involved.

taking decisions of availing credit. Their reasonable influence was observed in selling and buying of animals (3.60%), selling of milk and milk products (3.27%), selling of milk and milk products sold (2.62%) and utilization of cow dung (1.64%).

Kota tribal households involvement in decision-making with respect to selling and buying of animals was mostly dominated by the husband decisions (58.83%) followed by collectively (25.49%) and then both wife and any other (7.84% each). Regarding the account of milk and milk products sold, majority of decisions were taken by wives (35.30%) followed by collectively (31.37%), husband (25.49%) and any other (7.84%). For the selling of milk and milk products, husband (54.90%), wives (27.46%), any other (9.80%) and collective (7.80%) were involved in decision-making. Similarly, in the practices of utilization of cow dung, husband (72.55%), wives (19.61%), collectively (5.88%) and any other (1.96%) were taking decisions. For availing credit, majority of the decisions were taken collectively (68.63%) followed by husband (23.53%) and wife (7.84%).

Toda tribal households showed the decision making with respect to different marketing activities of dairy farming which was in case of selling and buying of animals, husband (62.75%), collective (21.57%), wives (9.80%) and any other (5.88%) were involved. Keeping the account of milk and milk product sold was decided collectively (43.14%) followed by husband (33.33%), wives (19.61%) and any other (3.92%). Regarding selling of milk and milk products, husband (54.71%), wives (19.61%), collective (9.80%) and any other (5.88%) had taken the decisions. About utilization of cow dung, husband (76.47%), wives (19.61%) and collective (3.92%) whereas none of any other were involved in decision making. Availing credit was decided collectively (70.59%) followed by husband (19.61%) and wives (9.80%).

Table 1: Decision-making pattern of tribal households in marketing activities.

Decision makers	Kotas N=51	Todas N=51	Paniyas N=51	Irulas N=51	Kurumbas N=51	Kattunaickas N=51	Pooled N=306
Selling and buying of animals							
Husband	30	32	37	36	36	39	210
	(58.82)	(62.75)	(72.55)	(70.59)	(70.59)	(76.47)	(68.62)
Wife	4	5	4	3	2	3	21
	(7.84)	(9.80)	(7.84)	(5.88)	(3.92)	(5.88)	(6.86)
Collective	13	11	10	12	9	9	64
	(25.49)	(21.57)	(19.61)	(23.53)	(17.65)	(17.65)	(20.92)
Any other	4	3	0	0	4	0	11
	(7.84)	(5.88)	(0.0)	(0.0)	(7.84)	(0.0)	(3.60)
Keeping the account of milk and milk products sold							
Husband	13	17	16	15	13	20	94
	(25.49)	(33.33)	(31.37)	(29.41)	(25.49)	(39.22)	(30.72)
Wife	18	10	12	19	16	6	81
	(35.29)	(19.61)	(23.53)	(37.25)	(31.37)	(11.76)	(26.47)

Collective	16	22	19	17	22	25	121
	(31.37)	(43.14)	(37.25)	(33.33)	(43.14)	(49.02)	(39.54)
Any other	4	2	4	0	0	0	10
	(7.84)	(3.92)	(7.84)	(0.0)	(0.0)	(0.0)	(3.27)
Selling of milk and milk products (a. Quantity & To whom)							
Husband	28	33	39	36	34	39	209
	(54.90)	(66.71)	(76.47)	(70.59)	(66.67)	(76.47)	(68.30)
Wife	14	10	7	5	9	11	56
	(27.45)	(19.61)	(13.73)	(9.80)	(17.65)	(21.57)	(18.30)
Collective	4	5	5	10	8	1	33
	(7.84)	(9.80)	(9.80)	(19.61)	(15.69)	(1.96)	(10.78)
Any other	5	3	0	0	0	0	8
	(9.80)	(5.88)	(0.0)	(0.0)	(0.0)	(0.0)	(2.62)
Utilization of cow dung							
Husband	37	39	45	37	42	44	244
	(72.55)	(76.47)	(88.24)	(72.55)	(82.35)	(86.27)	(79.74)
Wife	10	10	2	2	5	4	33
	(19.61)	(19.61)	(3.92)	(3.92)	(9.80)	(7.84)	(10.78)
Collective	3	3	4	10	4	1	24
	(5.88)	(5.88)	(7.84)	(19.61)	(7.84)	(1.96)	(7.84)
Any other	1	0	0	2	0	2	5
	(1.96)	(0.0)	(0.0)	(3.92)	(0.0)	(3.92)	(1.64)
Availing credit							
Husband	12	10	5	8	6	9	50
	(23.53)	(19.61)	(9.80)	(15.69)	(11.76)	(17.65)	(16.34)
Wife	4	5	1	0	1	0	11
	(7.84)	(9.80)	(1.96)	(0.0)	(1.96)	(0.0)	(3.60)
Collective	35	36	45	43	44	42	245
	(68.63)	(70.59)	(88.24)	(84.31)	(86.27)	(82.35)	(80.06)
Any other	0	0	0	0	0	0	0
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Overall pooled							
Husband	22	26	28	26	26	30	158
	(43.14)	(50.98)	(54.90)	(50.98)	(50.98)	(58.82)	(51.63)
Wife	10	8	5	6	7	5	41
	(19.61)	(15.69)	(9.80)	(11.76)	(13.73)	(9.80)	(13.40)
Collective	14	15	17	18	17	15	96
	(27.45)	(29.41)	(33.33)	(35.29)	(33.33)	(29.41)	(31.37)
Any other	5	2	1	1	1	1	11
	(9.80)	(3.92)	(1.96)	(1.96)	(1.96)	(1.96)	(3.60)

In case of Paniya tribal households as Table 1 indicates that about selling and buying animals, majority of decisions were taken by husband (72.55%) followed by collective (19.61%) and wife (7.84%). No decision was made by any other regarding selling and buying of animal. For keeping the account of milk and milk products sold, collective (37.25%), husband (31.37%) and wives (23.53%) and any other (7.84%) were involved in decision-making. Husband (76.47%) had taken majority of decisions related to selling of milk and milk products followed by wives (13.73%) and collective (9.80%). None of decision by any other for the practice of selling of milk and milk products. In case of utilization of cow dung, husband (88.24%) followed by husband (9.80%) and wives (1.96%). None of the decisions had taken by any other regarding availing credit.

Table 1 indicates that in tribal tribal households husband (70.59%) followed by collective (23.53%) and wives (5.88%) had taken decisions regarding selling and buying of animals. Whereas, no decision was made by any other for the practice of selling and buying of animals. For practice of keeping the account of milk products sold, majority of decisions were taken by wives (37.26%) followed by collective (33.33%) and husband (29.42%) and selling of milk and milk product was decided by husband (70.59%) followed by collective (19.61%) and wives (9.80%).

As far as Kurnumba tribal households are concerned, majority of decisions had been taken by husband (70.59%) followed by collective (17.65%), any other (7.84%) and wives (3.92%) regarding selling and buying of animals. For keeping the account of milk and milk products sold, collective (43.14%), wives (31.37%) and husband (25.49%) had taken the decisions. Regarding selling of milk and milk products, most of the decisions were taken by husband (66.64%), wives (17.64%) and collective (15.69%). None of the decisions had been taken by any other regarding selling of milk and milk products. Husband (82.36%), wives (9.80%) and collective (11.76%) were involved in decision-making regarding utilization of cow dung. Availing of credit was decided collectively (86.27%), husband (11.77%) and wives (1.96%). None of the decisions were by any other regarding keeping the account of milk and milk product sold, selling of milk and milk products, utilization of cow dung and availing credit.

In case of Kattunaicha tribal households, majority of decisions were made by husband (76.47%) followed by collective (17.65%) and wives (5.88%) regarding selling and buying of animals. For keeping the account of milk and milk products sold, most of the decision were taken collectively (49.02%) followed by husband (39.22%) and wives (11.76%). Selling of milk and milk products was decided by husband (76.47%) followed by wives (21.57%) and collective (1.96%). In case of utilization of cow dung, husband (86.28%) and wives (7.48%) any other (3.92%) and collective (1.96%) were involved in decision making. In case of availing credit, most of the decisions were collective (82.35%) followed by husband (17.65%). Wives were not involved in decision making regarding availing credit. Similarly any other were not involved in decision making regarding selling and buying of animals, keeping account of milk and milk products sold, selling of milk and milk products and availing credit.

CONCLUSION

The low participation of women in decision making related to marketing activities of dairy farming can be attributed to the reason that almost all the work related to marketing, mainly done by their male counterparts. However, the study reveals that in some areas of dairy marketing, i.e. keeping the account of milk and milk products sold and availing credit, collective decision were more which shows the involvement of women.

Crisis Management Level of Farmers of Drought Areas

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The environmental factors play a pivotal role for sustainable agricultural development. Among the diverse ecological environmental factors, deficit rainfall is of special significance in Indian agricultural economy. Drought, a natural calamity, occurs in India causing huge economic loss in addition to poverty, malnutrition and social problems. Thus, it is

of the greatest concern for policy makers for attaining stability in agriculture. Gujarat State is also a host of many drought years owing to 79.00 per cent of land depending on vagaries of monsoon. The encountering of unprecedented drought in successive three years, from 1985-88, during 1991-92 and also during 2002-03, created a crisis situation in Gujarat.

The drought labelled as 'creeping disaster', provides sufficient time for preparation to counter its impact noting that, drought can be managed to lessen its ill effect on farming population. So, it is an interesting research area to explore the possibilities of management. Thus, farmers evolve response mechanism for exploiting all viable means to achieve economic security. Keeping this view in mind, the present study was undertaken with the specific objective to study the crisis management level of the farmers.

METHODOLOGY

The present study was carried out in ten villages of two blocks of Banaskantha district of Gujarat State. From each identified village, 15 respondents were selected randomly. Thus, the total sample of respondents included in the study were 150. The crisis management level of the respondents was measured with the help of a management test. The data collected through interview schedule were tabulated, organized, analysed and presented in a way that it may give proper representation and answer to the specific objective of the study.

RESULTS AND DISCUSSION

The data presented in Table 1, reveals that more than half (54.00) percent of the farmers belonged to medium crisis

management group, followed by low (24.00 per cent) and high (22.00 per cent). The mean crisis management scores were 80.06, 178.36 and 268.91 for low /medium and high crisis management group respectively.

Table 1: Crisis management level of farmers (N=150)

Crisis management groups	Number	Per cent	Mean crisis management score
Low group	36	24.00	80.06
Medium group	81	54.00	178.36
High group	33	22.00	268.91
Total	150	100.00	174.68

It can be concluded from the Table that more than three-fourth (78.00 per cent) of the farmers clustered in low and medium crisis management categories as against approximately one fifth (22.00 per cent) who belonged to high crisis management group.

The clustering majority of the farmers in the medium crisis management group with limited number recorded in high and low crisis management groups could also be explained by logical reasoning with the support of related research studies. These are delineated as follows:

Firstly, crisis management is a composite behavior controlled by direct and indirect effects of personality variables of farmers and socio-situational as well as organizational factors. Farmers being from drought prone areas where the scarcity of the rainwater holds the key for behavioral actions, are controlled by above-mentioned factors. Therefore, efficient management of this situation with objective analysis of physical and situational constraints is probably not forth coming among the majority of the farmers.

Secondly, drought prone areas are comparatively backward areas with deeply ingrained beliefs with fatalistic attitude towards development.

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Thirdly, the study of dryland area farmers is accustomed to under use the available resources for dryland crops. This result in low income, leading to less investment in the succeeding years thus, the cycle of vicious circle continues. This circle when meets with a drought year will cause a still bud impact on the farm economy.

Fourthly, lack of drought preparedness, is a crucial task, missing among majority of farmers, which might have also made them readily susceptible to drought induced crisis.

Finally, it was observed that farmers have common feeling that drylands are useless. These clearly point out that they have underestimated the potentials of drylands under good management. Possibly, this feeling also weakened their effort towards better management of drylands. These findings are in line with the findings of Ramagowda (1991).

An examination of data presented in Table 2, indicates that majority (63.64 per cent) of marginal farmers were under low crisis management group, followed by medium (27.27 per cent) and high (9.09 per cent) crisis management groups. Amongst small farmers, 76.00 per cent of respondents concentrated under medium crisis management level and about 16.00 per cent of small farmers contained in low level of crisis management, while, only 8.00 per cent of the small farmers were found to be in high crisis management group. In contrast to small and marginal farmers, an interesting trend was observed with reference to big farmers. The highest percentage (57.14 per cent) of big farmers concentrated in high crisis management group, followed by moderate (35.71 per cent) and low (7.14 per cent) level of crisis management. The mean crisis management scores within each farmer's category were also on the increase from low to high crisis management groups.

However, presence of at least a small per cent of marginal and small farmers in high crisis management group indicated the possibility of improving the crisis management level of these categories of farmers. Further, to explicate these findings, the data were subjected to ANOVA. The results of the analysis are depicted in Table 3.

Table 2 : Crisis management level of different categories farmers

Crisis management group	Farmers Categories						Total (150)	
	Marginal (33)	Small (75)		Big (42)		No.	Mean score	
		No.	Mean score	No.	Mean score			
Low	21(63.64)	76.76	12(16.00)	83.86	3(7.14)	87.88	36(24.00)	80.06
Medium	9(27.27)	163.74	57(76.00)	180.92	15(35.71)	177.41	81(54.00)	178.36
High	3(9.09)	304.83	6(8.00)	294.47	24(57.14)	288.04	33(22.00)	268.91
Total	33 (100.00)	121.20	75(100.00)	174.47	42(100.00)	217.08	150(100.00)	174.68

*Figure In Parenthesis Indicate Percentage

As seen from the table, the F-ratio computed for farmers category was found to be 1684.78, which was significant at 0.01 level. The results clearly indicated that the farmers' categories differed significantly from each other with respect to crisis management scores. It was found that the critical difference (C.D.) value estimated was less than the mean crisis management scores, difference of farmers categories, indicating that each farmers category differed significantly with other categories with respect to total average crisis management scores.

Personal construct theory proposed by Kelley (1955) delineated that the capacities to change vary among the individuals and so also, tolerance limits to environmental changes. This could be attributed to the resource endowments of farmers' categories. Further, Saha (1973) stated that small farmers are characterised by small and fragmented holding, lack of assured means of irrigation and household expenditure involving more than 75.00 per cent of the receipts. Also, small farmers were handicapped financially and had no capacity to take new technology and the risk. This biography of small farmers is enough to reveal that the entrepreneurial behavior is scarce among small landholders as an entrepreneur possess the qualities of high risk taking ability. That is why, the category of large farm size farmers was better than small farm size, leading to high crisis management.

Table 3 : Two way ANOVA of crisis management groups and farmers categories

Source of Variation	d.f.	Mean square	F ratio	C.D. Value
Crisis management group	2	308238.56	6114.63**	3.01
Farmers categories	2	84929.86	1684.78**	2.95
Error	145	50.41		
Total	149	-		

**Significant at 0.01 level of probability

All the above reason would have together contributed for observed difference in mean crisis management scores among farmer's categories.

CONCLUSION

More than half (54.00 per cent) of the respondents were found in medium crisis management group, followed by low and high crisis management group. Majority of small and marginal farmers were found in medium and low crisis management group, but, big farmers clustered in medium and high crisis management group. The results indicated that the farmer's categories differed significantly from each other with respect to crisis management.

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Capacity Building Needs for the Small Tea Growers of Assam

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Small Tea Growers (STGs) have been playing an important role in the economy of Assam. The tea plantations established in small areas have now become an important employment avenue providing self-employment to many unemployed youth in the state. Moreover it has a significant contribution to the total tea production of Assam. Although the area under this small tea sector has been increased in at a faster rate, production per unit area has not much increased over the years. In such a situation capacity building of the STGs with respect to tea cultivation practices and technologies through appropriate training modules can play a great role in increasing their productivity. Training need refers to the difference between the actual conditions at present and the desired condition in the work situation of the STGs in terms of knowledge and skill which will help them to fill the gap and arrive at desired level of performance in their working condition. The present study was designed with the objectives:

- To analyze the training needs of the STGs and
- To formulate suitable training strategies for the development of the STGs.

METHODOLOGY

The study was conducted in two districts viz. Dibrugarh and Golaghat of Upper Brahmaputra Valley Zone, Assam on the basis of the results of proportionate random sampling. Proportionate random sampling technique was also used to select 40 STGs from Dibrugarh district and 20 STGs from Golaghat district. The data were collected with a well-structured and pre-tested interview schedule.

There were many areas in tea cultivation and technology for STGs but all the areas were not equally important for them. Some areas were there which the respondents considered as

'most important' and here they need more training. So importance level of training items for STGs on all the 30 items was worked out. The training need score (TNS), which reflects the training needs of the STGs for each item was calculated by using the following formula as adopted by 'Ghuman et al. (1999)'. The TNS for all the items was classified into low, medium and high using cumulative frequency values and on this basis low, medium and high training importance status was assigned against each item.

RESULTS AND DISCUSSION

Training needs intensity of STGs

Training need intensity of the individual practices as perceived by the STGs was found out and the result is given in Table 1. The TNS values gave the training need score for the individual practices.

Table 1 indicates that the training need score of the STGs with respect to the practices viz. Pruning, soil, improved variety, pest and disease management, plucking, labour management, record management, risk management, weed management, propagation of tea plants and soils for tea cultivation was found to be high. The main reason for this is the fact that all the above factors were active determinants of the quality of tea produced, for which the STGs were very much concerned of. For eg. pruning of tea bushes have got a direct effect on the quality of green tea leaves produced in the next peak season. So if pruning was not done at the appropriate time with appropriate procedure, the quality of green leaves and as well as the volume of tea leaves produced in the next season would get lowered.

Table 1: Intensity of capacity building needs felt by STGs (N=60)

Technological needs	Mean TNS	Category of needs
Soils for tea cultivation	2.05	High
Improved variety of tea	2.06	High
Tea seed selection	1.38	Low
Selection of tea clones	1.35	Low
Tea seed nurseries	1.70	Medium
Land preparation	1.73	Medium
Propagation of tea plant	2.50	High
Method of tea planting	1.78	Medium
Drainage in tea planting	1.68	Low
Pruning of tea bushes	3.00	High
Insect pest management	2.63	High
Weed management in tea	2.10	High
Disease management in tea	2.41	High
Use of fertilizers	1.63	Low
Management of shade trees	2.35	High
Tea manuring	1.71	Medium
Irrigation in tea plantation	1.55	Low
Water conservation measures	2.03	Medium
Plucking of tea	2.71	High
Storage of tea seeds	1.11	Low
Processing of green tea leaves	1.41	Low
Organic farming	1.80	Medium
Machinery used, repair and maintenance	1.76	Medium
Marketing management skills	1.93	Medium
Planning skills	1.43	Low
Decision making skills	1.55	Low
Risk management skills	2.11	High
Leadership skills	1.20	Low
Labour management skills	2.06	High
Record management skills	2.05	High2

Similarly if plucking was not done at recommended time and recommended plucking procedure was not followed, the quality of tea produced would be of low grade and as a result STGs would not fetch a good price for their green leaves. Weed management, insect pest management and disease management also effect the volume and quality of production of green tea leaves. Similarly the other training areas which fall under this 'high' category effects the quality and volume of tea produced. So the STGs were found to have a higher training need score with respect to the above areas in order to orient/acquaint them better with the practices.

The Table 1 also indicates the training need score to be medium for the areas such as seed nurseries, land preparation, method of tea plating, tea manuring, water conservation measures, organic farming, machinery used, repair and maintenance and marketing management. The cause for this medium level of training needs score might be varied. For eg. majority of the STGs were not raising their own tea seedling, but were procuring from some other sources which they find to be convenient for them than raising their own seedlings. So they do not feel much to be trained in this area. Similarly other practices such as land preparation, method of tea planting and tea manuring might be a too simple practice for the STGs due to which they do not feel the requirement of high degree of training in these areas. Similarly type of conclusion can also be drawn for the other areas under this 'medium' category due to which STGs were not having a high degree of training intensity with respect to the practice coming under this medium category.

It can also be observed from the Table 1 that the training need score of the areas such as tea seed selection, selection of tea clones, drainage, use of fertilizers, irrigation in tea plants, storage of tea seeds, processing of green leaves, planning skills, decision making skills and leadership skills found to be low. The main reason for this might be that either some of these practices were very common to the STGs or it might be that, STGs were not going for tea seed nurseries and as a result of this they did not feel to be trained in this area. Similarly STGs were not having tea factories so they did not feel the need to be trained in the processing aspect etc.

Training facility preference of STGs

It could be observed from the Table 2 that a majority (63.34%) of the STGs preferred peripatetic training, one-third of them preferred correspondence course and the remaining 3.33 per cent preferred institutional training for tea cultivation. A high preference of peripatetic training may be attributed to that fact that as tea growing is a highly management oriented enterprise and requires a high degree of practical skill, the STGs wanted the training to be imparted on the farmers field center around a demonstration. This type of training required more skills than a more theoretical training. Moreover the study has revealed that STGs were highly literate. Due to this degree of literacy existing amongst the STGs they found to have a good zeal towards correspondence courses. A very low degree of preference for institutional training might be due to the fact that the STGs might feel inconvenient with this type of training as they feel more convenient when the trainings are imparted in the locality itself.

With reference to the training method, it could be inferred from the Table 2 that more than half (55.00%) of the STGs preferred field trip, one-fourth (25.00%) preferred group discussion, and remaining one-fifth (20.00%) preferred demonstration. The reason for high preference for field trip

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might be due to the fact that STGs were more concerned toward gaining practical knowledge through practical experience rather than theoretical knowledge. Field trip helps the STGs to gain first hand knowledge about the field situation. So it was seen that more than half of the STGs had preferred field trip to the training method.

Table 2: Training preferences of STGs (N=60)

Particulars	Number	Percentage
Type of training	38	63.34
Peripatetic training	2	3.33
Institutional training	20	33.33
Correspondence course		
Training method	15	25.00
Group discussion	33	55.00
Field trip	12	20.00
Demonstration		
Place of training	33	55.00
Tea growers field	27	45.00
A.A.U.		
Duration of training	7	11.67
1 day	23	38.33
2 day	30	50.00
3-5 day	60	100.00
Month of training Nov-January		
Trainer		
a. A.U./T.R.A scientist	60	100.00
b. Progressive STGs		
Participation in trainers programmes		
a. Individual	0	0.00
b. Small group	60	100.00

It could be observed from the Table 2 that more than half (55.00%) of the STGs preferred tea growers field as the avenue for training, and the remaining (45.00%) preferred A.A.U. (Assam Agricultural University) as the venue. The reason for this may be the fact that the STGs might be feeling more convenient in their fields rather than going to A.A.U. The STGs difficult to go to A.A.U. for the purpose of attending training programmes due to the lack of adequate communication facility and also as it becomes expensive for the STGs.

Regarding duration of training, it could be inferred from the Table 2b that half (50.00%) of the STGs preferred the duration of training to be 3-5 days, whereas more than one-third (38.33%) preferred 2 days training. Remaining (11.67%) days training may be attributed to the fact of tea being a highly management intensive crop. The STGs felt the requirement of

longer time period for training for acquainting themselves with the different tea cultivation practices and technologies.

Table 2 indicates that all the STGs (100.00%) preferred to make training during November-January. The main reason for it was that during November-January, rice harvesting is generally over in Assam. As majority of the STGs of Assam were also rice cultivators, they generally become free from the household activities when the harvesting was over. Moreover, during the period of November-January only pruning is done, and it was seen from the training need preferences that the STGs were having a high preference for pruning. Moreover, the STGs who were also service holders prefer this time period for training as the other STGs who were not service holders were free of other farm activities.

Table 2 also indicates that all the STGs (100.00%) preferred A.A.U. /T.R.A (Tea Research Association) scientists to be their trainer in tea cultivation practices and technologies. This might be due to the fact that STGs were having more confidence on A.A.U. /T.R.A. scientist rather than their fellow progressive STGs. It could also be inferred from the Table 2b that all the STGs (100.00%) wanted to attend the training in small groups rather than individually. The probable reason for it might be that the STGs feel more comfortable in attending training programmes in groups rather than attending individually.

CONCLUSION

On the basis of the result of training need intensity the following strategies were drawn for the development of the STGs.

1. Training should be made more intense in those areas such as pruning, soils for tea cultivation, plucking etc. in which the STGs felt the necessity to be trained more intensively.
2. Effort should also be given to train the STGs in those areas where they did not express a high level of desire to get trained as these areas also play a great role in increasing the productivity of tea.
3. The trainers should put more importance in organizing peripatetic type of training as from the study it was seen that most of the STGs preferred this type of training method.
4. The duration of the training should be made 3-5 days as most of the STGs preferred this to be the suitable duration to get a good training in tea cultivation practices.
5. The training programmes should be more intensified during November-December as during this period of the year most of the STGs becomes free of the household activities.
6. Lastly, the training programmes should be modified and refined according to the needs of the STGs.

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Problem Identification by Participatory Rural Appraisal

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Research and extension programs should be relevant to farmers' needs. Classifying the problems and defining the needs of the farmers is an important step in program planning in extension. However, this step is generally not followed while planning agricultural production programs at village level. Majority of scientists draws their idea for the research projects from supervisor scientists, authorities and colleagues and only 33 per cent of researchers draw their idea from farmers (Sabarathnam 1987).

Scholars have expressed concern regarding the unconcern of research programs to the field problems of the farmers and the poor quality extension programs. There is an urgent need for identification of technological needs of the farmers for developing realistic research and extension programs. The present study aimed at identifying the problems of farmers, with the help of PRA methodology.

METHODOLOGY

The study was conducted in tribal village Pitezhari. This is adopted village of Krishi Vigyan Kendra, Sakoli (Bhandara). To know the present status of village and need assessment of villagers, Participatory Rural Appraisal (PRA) was conducted in January 2005. This paper mainly deals with the identification of problems faced by Gond tribals with the help of PRA technique (Sabarathnam, 2002).

For the purpose of identification of problems three key informants were identified in the village. From each key informant the names of three farmers who actually faced the problems were listed by the key informants. Using Snow Ball Technique, we went and contacted farmers and asked to list out the problems faced by them, ranked the problems by indicating which problem he preferred to place at the top, which problem as second, third, fourth etc. and asked them to indicate the loss or extent of damage in terms of percentage for the estimation of economic importance of the problem. We did this till we got the data from 30 farmers including key informants.

By contacting 30 farmers, list of problems, ranking of problems and losses or extent of damage in terms of percentage was recorded. Then frequency of farmers for various ranks of the problem was recorded. To find out the importance of the problems perceived by the farmers and key informants, the Rank Based Quotient (RBQ) was calculated with the help of formula developed by Sabarathnam (1988).

RESULTS AND DISCUSSION

In total 30 problems were identified in the village which affected the development of the Gond tribals. These problems were ranked on the basis of village magnitude value as shown in Table 1. It was found that lack of irrigation water was the most important problem having the position of 1st rank, followed by problems of losses due to wild animals, low productivity, lack of money and lack of employment opportunities with II, III, IV and Vth rank in the list of thirty, respectively.

Village magnitude value of lack of irrigation is around 58 lakh. This is a very low difference in magnitude, which indicated that 11nd ranked problem is also very important. Animals from Nagzira forest cause serve losses of the crops. 70per cent average loss was noted due to this problem. Fifth ranked problem i.e. lack of employment had recorded maximum (80%) average loss in the total income of the Gond tribals followed by 73 per cent average loss by the problem of fragmentation of land. Pawar and Patil (1989) had also reported the constraint of fragmented land holdings in the agricultural development of Konkani tribals. Lack of knowledge about improved cultivation practices, pest and disease incidences, less fertilizer application, low market price of paddy are the major problems from top ten priority problems ranked as VI, VII, VIII and IXth, respectively.

Problem tree for low agricultural productivity in the village Pitezhari was prepared. Non adoption of improved cultivation practices, pest and disease incidents and losses due to wild animals were the major causes of low productivity. Illiteracy

tribals having less and unhealthy livestock, very low land holding and unemployment were found to be the roots of major problems.

Table 1: Rank based quotient, magnitude value and rank of different problems identified by the farmers

Problems	RBQ Value	Average % Losses	Area under Crop (ha.)	Magnitude Rank
Lack of irrigation water	98.15	69.00	83	562105.1 I
Losses due to wild animals	81.11	70.86	87	50002806 II
Lack of money	80.00	40.18	83	2667952 IV
Low productivity	65.92	63.37	83	3467201 III
Lack of knowledge	53.15	30.42	87	140663.6 VI
Pest & disease	39.26	38.48	83	125390.2 VII
Low market price of paddy	30.55	31.43	83	79695.48 IX
Less fertilizer application	30.18	35.45	83	88800.12 VIII
Ward problem	29.63	22.50	83	53334.03 XII
Lack of employment opportunities	28.52	80.91	87	200757.1 V
Poor extension service	21.30	23.00	83	40661.7 XIV
Lack of transport facility	20.92	19.55	87	35381.78 XV
Labor shortage at the time of transplanting	18.90	26.25	83	41178.38 XIII
Non availability of organic manure	16.67	40.71	87	59041.31 X
Market problem	16.48	20.55	87	29463.77 XVII
Less height of field boundaries (bund)	14.07	30.00	83	35034.3 XVI
Poor soil	11.11	33.00	59	21631.17 XVIII
Fragmentation of land	09.07	73.33	87	57863.97 XI
Delay payment of paddy	8.33	14.00	83	9679.46 XXII
Low water holding capacity	6.85	33.33	59	13470.32 XIX
Sloppy land	5.37	25.00	59	7920.75 XXIII
Lack of improved implements	5.37	8.33	83	3712.764 XXVII
No plant production	4.81	25.00	83	9980.75 XXI
Water logging in the field due to seepage from village pond	4.26	15.00	24	1533.6 XXIX
Long dry spell	3.33	42.50	83	11746.58 XX
Problem of electric load shedding	2.78	17.50	87	4232.55 XXVI
Excess nitrogen in field due to rural manure	2.59	20.00	10	518 XXX
Flooding in July-Aug and water scarcity	2.41	40.00	59	5087.6 XXIV
Poor quality produce	2.04	30.00	83	5079.6 XXV
Poor extension contacts	1.67	25.00	83	3465.25 XXVIII

Illiteracy, lack of communication, very low exposure, lack of confidence among the tribals and poor extension contacts of tribals resulted in lack of knowledge. Other reason for lack of knowledge was poor extension service of agricultural department due to lack of sufficient and unwilling staff. Lack of knowledge of tribal farmers is one important factor responsible for non adoption of improved cultivation practices. Similar causes were recorded by Rathod (2001) for Korta tribals of Melghat.

Second root of the tree was less and unhealthy livestock that results in very less availability of organic manure. Other root i.e. very low land holding and very less employment

opportunities resulted in poor economic condition of tribals which were the most important hurdles in purchase of chemical fertilizers. Less nutrient application through organic and inorganic fertilizer and soil erosion due to flooding in rainy days resulted in low soil fertility. Water is another important resource. Erratic rainfall, more runoff and improper rainwater management were responsible for non-availability of water in the village. These two resources with poor economic condition and knowledge level were responsible for non-adoption of improved cultivation practices.

Poor economic condition of tribal farmers was also the important constraint in plant protection. Due to the money problem tribal farmers were not able to purchase insecticides, which caused the loss in yield due to pest and diseases.

Boundary of Pitezhari village is adjoining to the Nagzira wildlife sanctuary. The wild animals from Nagzira forest cause the losses of crop cultivated by the Gond farmers of Pitezhari. Very severe losses (100% also) were reported by the farmers; hence this constraint was ranked 11nd as per village magnitude value. All these roots and branches of tree were responsible for very poor quality fruit i.e. low agriculture productivity.

For the solution of these constraints, possible interventions are given for different levels. Generation of location specific technologies and fencing on the boundaries of fields connected with forest are the possible interventions for the two major problems i.e. non adoption of agriculture technology and wild animals, respectively. In second level, Integrated Pest Management (IPM) for control of pest and diseases, Integrated Nutrient Management (INM) to increase the fertility of soil, implementation of soil and water conservation activities to check the soil erosion and flooding situation in the village, motivation of farmers for increasing the contacts and appointment of enthusiastic extension workers for better extension service are some of the opportunities to solve the problems of second level.

Seepage of water from village pond was noted to be a very important problem of the farmers. Flooding situation in rainy season and water scarcity in dry was observed in the village. Hence, repairing of village pond is urgently needed by the villagers, which can overcome the flooding condition and also be useful for protective irrigation to the crops. Increase in use of green manure, vermicompost, bio-fertilizer etc. and also the proper doses of chemical fertilizers are essential for nutrient requirement of soil and crops. Involvement of tribals in extension programme will help to increase their exposure and develop the confidence among them. Informal education, co-operative farming, cattle/buffalo/goat/poultry farming and other employment opportunities are the possible interventions for the root level problems. Considering the possible intervention for solving the problems, action plan of training, demonstrations (SLDs and OFTs) and other extension activities is being implemented as per calendar of operation.

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Research Note

Assessment of Sugarcane Technologies Under IVLP

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Sugarcane occupies a commanding position as an agro-industrial crop of the country covering around four million hectares land, which is about 2.0 per cent of the total net sown area. It stands as the second largest organised agro-industry after the cotton textiles. The productivity of sugarcane at national level is only 71.0 t/ha which is very less as compared to the yield (184.0 t/ha) obtained at research station. The reason appears to be the fact that the need based technologies have not yet reached the farmers for adoption. It has been observed that farmers could adopt only 30-35 per cent technologies while bulk amount of them are still unutilised. This shows that very wide information and adoption gaps exist between technology generation and technology utilization.

To sustain sugarcane production, an efficient transfer of need based technologies is of utmost importance. For this, emphasis should be given to transfer such technologies which are well suited to agro-climatic and socio-economic domains of farmers. Till now, very less effort has been made in this direction. Recently, Technology Assessment and Refinement through Institute-Village Linkage Programme was initiated with the objective to identify the need based technologies for combating local problems of the crops in the region. In the present paper, the result obtained in on-farm trials on need based innovative technologies are reported.

METHODOLOGY

The study was carried-out during 2001-02 to 2002-03 to assess the effectiveness of need based innovative technologies on crop productivity and income generation of sugarcane growers under Institute-Village Linkage Programme. A total of three villages viz.; Mahura Kala of district Lucknow and Husainabad and Beejapur of district Barabanki of Central Uttar Pradesh were purposively selected. Need based innovative technologies were identified by matrix scoring method under Participatory Rural Appraisal (PRA) technique. Need based technologies identified were (i) planting of sugarcane through cutter planter, (ii) Integrated nutrient management, (iii) Integrated pest management (iv) Intercropping in sugarcane (v) Trash mulching in ratoon cane. A team of interdisciplinary scientists discussed with the farmers in detail regarding the

importance and use of technologies for improving sugarcane productivity and net return. To create confidence among the farmers, on farm trials on identified technologies were laid-out on farmers fields and compared with existing farmers practices. Farmers of the village and nearby were taken around the on farm trials at different growth stages to make them aware and convince them for wider adoption of technologies at their own fields.

RESULTS AND DISCUSSION

Sugarcane planting through cutter planter

Planting of sugarcane is a labourious and time-consuming process. For planting of one hectare, about 25 to 30 labourers are required. Thus, it takes about 2 or 3 days to complete all the planting operations viz.; opening of furrows, application of fertilizers, cutting of sets and their dropping in furrows, application of insecticide and closing of furrows. If these operations delayed, the germination will be adversely affected due to loss of sett and soil moisture. To combat these problems, the Indian Institute of Sugarcane Research, Lucknow has designed and fabricated an innovative all-in-one cutter planter. It plants one hectare of land in a day with the help of 5 labourers. Thus, it saves about 40 to 50 per cent of planting cost and enhances germination up to 10 per cent by preventing sett and soil moisture loss.

Table 1: Economic of sugarcane planted through different implements

Particular	Country Plough	Blader	Cutter Planter
Yield (t/ha)	72	73	76
Gross Return (Rs/ha)	68400	69550	72200
Cost of Production (Rs/ha)	26251	26269	26349
Net Return (Rs/ha)	42149	42841	45851
Benefit-Cost ratio	2.55	2.63	2.73

Yield obtained from the on-farm trials indicated that sugarcane planted through cutter planter yielded 76.0 t/ha which was 6.0 per cent higher than in the conventional method of planting (Table 1). This resulted higher net return (Rs. 45851.0/ha) through cutter planter than the conventional

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method (Rs. 42149.0/ha). The benefit-cost ratio obtained through cutter planter was 2.73 which was 7.00 per cent higher than the conventional planting (2.55).

Integrated nutrient management (INM) in sugarcane

Sugarcane being a long duration and exhaustive crop removes considerably higher amount of plant nutrients from the soil. On an average, sugarcane crop yield of 100 tonnes removes 208, 53 and 280 kg per hectare of N, P₂O₅ and K₂O, respectively from the soil. Hence, it is essential to replenish the depleted soil with plant nutrients at desired level to restore and sustain the fertility/productivity of soil through integrated nutrient management system. Farmers generally apply inorganic fertilizers due to their easy availability and scarcity of organic manure. The physical, chemical and biological properties of soil get adversely affected due to continuous use of chemical fertilizers resulting in low yield of sugarcane. Hence, combined application of organic and inorganic source of plant nutrients may be done in such a way that the soil fertility is maintained without deteriorating cane yield. This system is called Integrated Nutrient Management (INM). The farmers of selected villages were generally applying inorganic fertilizers in imbalance amounts. Some of them were applying one-third to two-third amount of recommended doses of nitrogen and phosphatic fertilizers and no potash. Farmers were advised to apply recommended doses of fertilizers at proper time and appropriate method of application to sugarcane crop. For developing confidence, On-farm trials on INM were conducted and compared with recommended doses of inorganic fertilizer and prevailing practices (120 kg N/ha only).

Yield of sugarcane was 63 t/ha with existing farmers' practice while it was 82.0 t/ha in recommended doses of chemical fertilizers leading 30 per cent higher yield than the farmers' practice (Table-2).

Table 2: Economic evaluation of integrated nutrient-management (INM)

Particulars	Farmers' Practice (T1)	Recommended Dose of fertilizers (T2)	INM (T3)
Yield (t/ha)	63	82	84
Gross Return (Rs/ha)	59850	77900	79800
Cost of Production (Rs/ha)	25015	28932	30000
Net Return (Rs/ha)	34835	48968	49800
Benefit-Cost ratio	2.39	2.69	2.66

The INM gave 84.0 t/ha which was 33.0 per cent higher than that of the farmers' practice. In economic evaluation, net profits were recorded by Rs. 49800/- and Rs. 48968/ha in recommended doses of chemical fertilizers with and without FYM/press mud, respectively. These were 42 and 40 per cent higher than the farmers' practice (Rs. 34835/ha).

Integrated weed management (IWM) in sugarcane

Sugarcane being a long duration and widely spaced (60 x 90 cm row distance) crop provides an ample opportunity for several weeds to grow in vacant-space, right from planting to harvesting. There are several weeds viz., grasses, non-grasses and sedges. The intensity of these weeds depends on agro-climatic condition of the region. Research results indicated that more crop-weed competition occurs during early phase of sugarcane growth. If these weeds are not controlled in the critical period, the yield reduction of sugarcane ranges between 20 to 40 per cent. The critical period of crop-weed competition has been recorded to be 60-120 days after planting in spring cane and 150 days in autumn cane. It has been proved that sugarcane yield is obtained higher when required hoeings (3 or more hoeing) are followed. But due to higher wages of labour and insufficient availability, the farmers perform only one or two hoeings resulting into poor weed control in cane fields. Given technology checks the weeds with less cost involvement. The practice involves the use of chemicals along with hoeing and thus, reduces the cost on weed control without hampering the cane yield.

In On-farm trials, applications of Atrazine @ 1.0 kg a.i/ha with 1000 liters of water after 2 or 3 days of sugarcane planting under moist conditions controlled weeds up to 40-45 days. To manage broad leaved weeds, application of 2,4-D Sodium Salt @ 1.0 kg a.i/ha with 600 lit of water was done at 60 days after planting. Finally, one manual hoeing at 90 days after planting was also followed. IWM Technology thus, controlled all types of weeds in sugarcane field, IWM produced 70.0 t/ha cane yield with Rs 52538/ha as net return which were 24.0 and 34.0 per cent higher than the farmers' practice, respectively (Table 3). The input incurred under IWM technology was at par with the farmers' practices being followed i.e. two hoeing in sugarcane.

Table 3: Economics of integrated weed management (IWM) in sugarcane

Particulars	Farmers' Practice (T1)	Chemical weed Control (T2)	IWM (T3)
Yield (t/ha)	63	71	78
Gross Return (Rs/ha)	59850	67450	74100
Cost of Production (Rs/ha)	22370	22532	22885
Net Return (Rs/ha)	37480	44918	51215
Cost of Production (Rs/t)	355.08	317.35	297.42
Benefit-Cost ratio	2.675	2.994	3.088

Integrated pest management (IPM) in sugarcane

Long duration of sugarcane crop attracts large number of insect-pests from planting till harvest. Out of those, termite, root borer, shoot borer, top borer, stalk borer, internode borer, Pyrrilla, black bug etc. are the major insects infesting sugarcane crop. It has been observed considerable damage to sugarcane crop. It has been observed that 25.0 to 45.0 per cent losses are recorded if proper control measure is not adopted. Generally, farmers pay less attention to

protect the crop due to non-awareness resulting in poor yield of sugarcane. To convince the farmers, on-farm trials on integrated pest management were laid-out and yield and net return were compared with existing farmers' practices. Sugarcane yield in a crop applied with chlorpyrifos at planting to manage termite infestation, borer damaged plants rogued out and application of insecticide to manage borer (III brood) was 81.0 t/ha which was 33.0 per cent higher than the farmers' practice (62.0 t/ha). Net return was also recorded higher by 33.0 per cent than that of the farmers' practice.

Inter-cropping in sugarcane

Inter-cropping is one of the most important steps towards increasing land productivity in sugarcane based cropping systems and providing additional income to the farmers. It ensures efficient utilization of resources like land, labour, water, manures, etc. Weeds are controlled due to repeated cultural operations and earlier sufficient canopy development by inter-crops in the space left between cane rows. In case of autumn sugarcane, inter-crops also provide protection to young cane sprouts against frost injury. Sugarcane is planted at a wider distance (60 to 90 cm). It takes about 30 to 40 days for germination and initial growth also remains slow which leads very low land coverage by the crop canopy, to about 120-130 days in case of autumn planted sugarcane. This situation provides ample opportunities to grow a short duration crop successfully in between the rows of sugarcane.

On-farm trials on inter-cropping of mustard and pea with sugarcane were conducted and yield and net return were compared with sole crop. Sole sugarcane produced 71.0 t/ha yield, while mustard and pea inter cropped with sugarcane

gave 16 and 22 t/ha with 67.0 and 68.0 t/ha sugarcane, respectively. Thus, the equivalent cane yield of cane + mustard (84 t/ha) and cane + pea (90 t/ha) was found higher by 19.0 and 28.0 per cent than that of the sole sugarcane. Similarly, net return was also higher in cane + mustard (19.0 per cent), and cane + pea (42 per cent) than sole sugarcane.

Trash mulching in ratoon

Major constraints for sugarcane productivity are sub-optimal availability of irrigated water and poor soil fertility. Several approaches have been tried to evolve technology for producing good sugarcane crop under these constraints. One of the most promising technology which has gained large acceptability is trash mulching. Trash mulching besides conserving soil moisture, improves N-use efficiency, checks weeds and reduces shoot borer infestation. In the trial, sugarcane trash was spread in between two rows of cane to make 8 cm. thick mulch. Application of chlorpyrifos @ 1.0 kg a.i/ha was sprayed on mulch against termite and army worm. Data revealed that trash mulched crop produced 60.0 t/ha which was 24.0 per cent higher than the no trash mulched (49.0 t/ha). Net return was also obtained higher by 28.0 per cent in trash mulch crop over no trash mulch.

CONCLUSION

The results of on-farm trials on need based technologies in sugarcane under IVLP revealed an increase in productivity and income by means of sugarcane standing through cutter-planter, integrated nutrient management, integrated weed management, integrated pest management, inter-cropping and trash mulching in ratoon.

Impact of Watershed Development Project

Sandeep Kumar and Joginder S. Malik

Watershed approach to development of agriculture and rural areas in India is not a new strategy. It has been recognized ever since the 1930s. But this was not an integrated approach of management. The approach to the Watershed Programme as a strategy for overall development of rainfed areas in India was initiated during the period 1975 and 1983 on a pilot basis and it has been in operation since the Seventh Five year Plan. In Haryana, Sukhomajri Integrated Watershed Development Project was the first experiment, which was started in 1975 by CSWCRTI, Chandigarh Centre and funded by the Ford Foundation, New Delhi. Since then this approach has been used in Bunga watershed development project in Shivallik foothills of Haryana. These watershed project envisaged at improving the production of arable and non-arable land feed and fodder for animals and socio-economic and environment conditions in the watershed area.

Since long, Watershed Development Programme is being implemented in our country. It is a general experience that soil conservation structures are beneficial from soil and water conservation point of view. Also there is a good impact of these Programmes in increasing the socio-economic level and living standard of the beneficiaries. But it is necessary to assess the impact on the farming community with respect to various factors. With this view, the present study was undertaken to assess the impact of these watershed development project on the farming community.

METHODOLOGY

The study was conducted in Panchkula district of Haryana as the Bunga and Sukhomajri watershed development projects fall under the boundary of this district. Four villages viz., Bunga and Sukhomajri as watershed villages and Rattput and Basola as non-watershed villages were selected. From each selected village, 40 farmers were selected through simple random sampling technique. In all 160 respondents viz., 80 respondents from watershed villages and 80 respondent from non-watershed villages were selected. The impact was assessed by comparing the response of watershed and non-watershed respondents towards common agriculture parameter. The selected respondents were interviewed with the help of pre-tested

structure interview schedule. The data thus collected was statistically analyzed.

RESULTS AND DISCUSSION

It is evident from the results depicted in Table 1 that average size of land holdings of respondent in watershed villages was larger as compared to that for respondent in non-watershed villages. The percentage to net cropped area for watershed villages was 92.45 as against 85.05 for non-watershed villages. Similarly, the percentage of gross cropped area for watershed farmers was 172.80 as against 137.91 for non-watershed farmers. This may be due to the variable size of land holdings of respondents in two groups i.e. watershed and non-watershed.

Table 1: Land use pattern of respondent in watershed and non-watershed villages.

Particulars	WSV (N=80)	NWSV (N=80)
Average size of land holding (acres)	4.73	3.86
Net cropped area (%)	92.45	85.05
Area cropped more than once (%)	80.35	52.86
Gross cropped area (%)	172.80	137.91
Cropping intensity (%)	186.91	162.14
Net irrigated area (%)	86.55	48.83
Area irrigated more than once (%)	66.16	28.68
Gross irrigated area (%)	152.71	76.96
Irrigation intensity (%)	176.44	157.40

WSV - Watershed Villages, NWSV - Non-watershed Villages

Further, the results showed that in case of watershed farmers 86.55 per cent of net-cropped area was irrigated. The corresponding figure for non-watershed farmers was very low i.e. 48.88 percent. Again the cropping intensity achieved by watershed farmers was 186.91 per cent as compared to 162.14 per cent for non-watershed farmers was 186.91 per cent as compared to 162.14 per cent for non-watershed farmers.

Irrigation intensity achieved by watershed farmers was also higher (176.44%) as compared to the irrigation intensity (157.40%) achieved by farmers of non-watershed area. Thus, higher percentage of net cropped area and gross cropped area, higher cropping intensity and irrigation intensity for watershed farmers than that for non-watershed farmers showed the positive impact of the watershed treatment.

Cropping pattern of respondents

Table 2: Cropping pattern of respondents under watershed and non-watershed village (N=160)

Season	Crops	Area under each crop (%)	WSV	NWSV
Kharif	Maize		53.45	42.34
	Groundnut		21.40	16.28
	Bajra		08.92	27.33
	Jowar		09.70	06.53
	Others (pulses, oil, etc.)		06.50	07.55
Rabi	Wheat		63.43	59.86
	Gram		16.00	19.63
	Mustard/Rapeseed		10.67	14.89
	Barseem/oats		02.33	-
	Others (Barley, taramira, etc.)		07.57	05.620

WSV - Watershed Villages, NWSV - Non-watershed Villages

The study revealed (Table-2) the fact that in watershed villages, the area devoted by the respondent to maize, groundnut, wheat, barseem and jowar crops was higher as compared to the area allocated to these crops by respondents of non-watershed villages. This may be due to increase in irrigation potential, the watershed farmers had changed the cropping pattern, might be the desirable outcome of watershed development project.

Productivity of important crops

The data presented in Table 3 reveal that in watershed villages, the yield achieved by the respondents for maize crop was 928 kg/ha, groundnut 1190 kg/ha, gram 1036 kg/ha, wheat 2640 kg/ha, bajra 1946 kg/ha and rapeseed mustard 1630 kg/ha.

On the contrary, in non-watershed villages, the yield obtained by the respondents for maize crop was 857 kg/ha, groundnut 1027 kg/ha, gram 670 kg/ha, wheat 1492 kg/ha, bajra 1792 kg/ha and for rapeseed-mustard it was 1460 kg/ha.

Table 3: Productivity of important crops grown by the farmers of watershed and non-watershed villages (N=160)

Crop	Average yield (kg/ha)	
	WSV	NWSV
Maize	928	857
Gram	1036	670
Groundnut	1190	1027
Bajra	1946	1792
Wheat	2640	1492
Rapeseed/mustard	1630	1460

WSV - watershed villages, NWSV - non-watershed villages

Further it was found that average yields for almost all crops achieved by respondent of watershed villages were markedly higher than those achieved by the respondent of non-watershed farmers. This clearly shows that there were positive and significant impact of watershed treatment on crop yield. Pendke et al. (1999) in their study revealed that most of the farmers benefitted moderately to high in respect of crop yield, moisture status and increase in pasture yield due to the watershed development programme.

The study highlighted the significant impact of watershed development projects on the farmer's land use pattern, cropping pattern and productivity of crops. more watershed development projects on the pattern of Bunga and Sukhomajri should be implemented in other rain fed areas as well.

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In this backdrop, the study was conducted with the objectives of identifying the specific elements in rituals as influenced by the various farming practices and assessing the scientific retinal of these elements in the context of farming.

The research aimed to trace out the history of an agrarian society that prevailed in the past. In the backdrop of the stated objective it was inferred that most of the attributes included in the study were exploratory in nature and hence exploratory survey design was adopted for the study. It was intended mainly to yield qualitative data and ethno history narration. The study was conducted in erstwhile Kothanthuradu of North Malabar region of Kerala state, the area extended over parts of Kozhikode, Kannur and Kasargod districts of North Kerala. The respondents were purposively selected individuals belonging to the following categories, viz; social workers of the region, members of the cultural and voluntary organizations connected with the performance of selected rituals, researchers belonging to different organizations who conduct investigations of different dimensions of rituals and professionals and experts in agriculture and allied sectors.

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RESULTS AND DISCUSSION

Narrowing down to North Malabar, people had a belief that the fecundity of plants and trees can influence human beings also. On this basis, different fertility festivals like *Nira*, *Puthi*, *Kothaamoorippattu*, etc. were conducted here, even *Oran* was also considered as a fertility festival too. In North Malabar as well as *valluvana* region, *Uchchaval* velakai are prevalent even now. The period following harvest is known as *Uchchaval*. The belief is that the land on which cultivation is to be started is compared with 'Mother God' or a female and in summer months supposed to take rest. This continues until the coming monsoon. So during the first week of *Karditakom*, soil should not be manipulated in any way also. Ploughing is strictly prohibited.

Food grains were considered as God by the people of Karnataka. Paddy grains were seen as a symbol of prosperity, and paddy inflorescence is believed to be 'Shree Bhagavathi' or Goddess of prosperity still today. On the day of Goddess Anantaram, there is a ritual of welcoming the Goddess of prosperity (Sreehothi as it is colloquially called) and of procuring Chetta (the symbol of scarcity). The former is in the month of month of Chingam and the latter is in the month of month of karkidakam. The activities in this ritual are as follows. Girls from every house collect materials like dried grass, broomstick, wooden spoon, etc. and put them into a clay pot then these materials are boiled in this pot in a solution made by washing rice grains in water. With this in hand they walk around the house thrice and then the whole stuff is then poured beneath the Sreehothi tree in the homestead. Meanwhile the girls chant the following lines: "Kaarakarkittaka maase po Mamukachinga monnaga".

There is another ritual in connection with tamarind for the same cause, but following conception. This is called 'pulikudi'. During the fifth, seventh and ninth month of conception, the pregnant women is supposed to consume a tablet prepared out of the seeds of several species of tamarind. They include valanpuli, panachippuli, chuthappuli, njerinjanpuli, Nieripuli and puliyaal. The rationale behind this could be that most of these are medicinal and may promote the health conditions of both the intra-uterine foetus and the expectant mother.

In the livestock sector, cow is believed to possess this property as that of tamarind. Based on this, there is a ritual

The myth is that Godavari (Nandin), the sacred cow is sent from heaven to earth by her mother Kaamadhenu (symbol of prosperity) in order to bring all sorts of prosperity here. It is usually performed after the first harvest of paddy crop. Godavari is taken to each and every house in the locality where they welcome her with the harvested agricultural products. This practice is called *kaazhchavappu*. The oldest woman member of the house is the one who generally does this. It is believed that once godavari comes to a place, the area gets rid of its 'panjani' (or scarcity). Even though this is the belief, what actually happens is that *pariyanmaar*, the group of people who accompany this Godavari makes this an opportunity to make their livelihood and get rid of their scarcity. Wood is carved out into the shape of a cow and a small boy enters within this hollow structure and assumes himself to be the cow. He performs a peculiar dance as the followers' sing song in praise of Annapoorneshwari, (the Goddess of food). Annapoorneshwari, the diety of Cherukuru, Annapoorneshwari temple is again mentioned in Chimmamaakkali, another folk art form: all these denoting a group of people or society who considered grain (Annam) as their Goddess: be the cause behind the origin of such art forms and rituals. The songs include *Vithupullappattu*, *Pashupathattu* and such folk songs in praise of crop seeds and livestock (Nambiar 1979).

Kerala state, with its highly diversified farming systems and cropping patterns possess mainly a rural population with varied cultural setting and value systems. The farming practices in each locality have deep-rooted influence by the traditions and beliefs of the community, simultaneously maintaining a reserve influence as well. The indigenous knowledge have been observed to be the accumulations of the ancestral wisdom carried over through generation. In the same way many of the rituals are also embedded in the traditional wisdom with sufficient rationale, generally related to the rural life activity, particularly the farming sector.

Development of people's Plan : Constraints Experienced by Women

Parvathy, S., G. Sobhna, P. Ahamed and Allan Thomas*

Development of agricultural sector is vital in the progress of any developing country whose economy depends mainly on agriculture. To achieve this, proper planning and implementation of agricultural development programmes and useful technology is needed. To obtain the best use of available land, a strategy of agricultural planning evolved at the grass root level and guided by a master plan for the whole state is essential. In this context, people's plan was formulated. The agricultural development strategy in the ninth plan aims at maximum utilization of locally available resources by working out optimum combination of resources, various methods and practices. Women in Kerala, even as they have made several impressive gains in the access of education, life expectancy and health have remained relatively invisible in the mainstream of development till today. One of the stated objective of the people's plan campaign was to raise the quality of women's participation in the development process and to infuse a greater sensitivity to women's concerns. A research investigation into the constraints experienced by women while undertaking the programme will enable the formulation of suitable measures to ensure the effective functioning of these developmental programmes. The study aimed at the constraints experienced by the women while undertaking Agricultural Development Programmes under People's Plan.

METHODOLOGY

The study was conducted in Thiruvananthapuram district. Multi-stage random sampling was followed for the selection of respondents. Thiruvananthapuram district consists of four taluks, 12 blocks and 89 Panchayats. From four taluks, two Panchayats were selected randomly from selected taluks two block Panchayats and from each of these four block Panchayats, two Grama Panchayats, and from each of these eight Grama Panchayats, 25 women respondents were selected at random. 20 rural women and five women office bearers. Thus, a total of 200 respondents constituted the study sample.

A list of possible constraints, while undertaking the programme was prepared after consulting the rural women folk, key resource persons and implementing officers. More number

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of constraints were added after review of literature and information available from different sources. These constraints were presented in the interview schedule as simple and clear statements. The two categories of respondents (rural women and women office bearers) were asked to respond to a five point continuum as 'very important', 'neither important nor less important', 'less important' and 'least important' with scores 4, 3, 2, 1 and 0 respectively. The over all mean score for each constraints were worked out for the two categories of respondents separately and ranking was done. Simple percentage analysis and Spearman's rank order correlation was used in the present study to measure the degree of agreement among the rural women and women office bearers in their ranking of constraints.

RESULTS AND DISCUSSION:

The constraints encountered by rural women while undertaking the programmes were listed in Table 1. The constraint that ranked first was political interference in selection of beneficiaries (3.26) followed by misutilization of incentives (3.11) and so on. Most often the beneficiaries were selected on the whims and fancies of local politicians. Care should be taken to ensure neutrality and definite criteria to determine the eligibility of the beneficiaries of the project should be followed.

It was also observed that many of the beneficiaries under the scheme misutilized the components. So it will be more effective if there is a provision for necessary supervision and guidance of implementing officials to their habitats also supplying of the incentives. Lack of necessary technical advice was another constraint encountered by rural folks. Lack of clarity on the concept and the objectives of the programmes will lead to the pit fall in the earlier planning process. Many of the women respondents complained that gramasabha meetings were conducted at odd time and place that are labourous, so inconvenient for them to attend. Many of them are labourers, so they have to go for work to earn their livelihood. Care should be taken by the officials that these meetings should be conducted at convenient time and convenient place. It was also formed that

male members are dominating in the programme and women do not allow women to open their mouth. The constraint that ranked sixth by many of the respondents was that ADPs are not need based.

Table 1. Constraints encountered by rural women.

Constraints	Rural women Mean score	Rural women Rank	Women office bearers Mean score	Women office bearers Rank
Political interference of beneficiary selection process	3.26	I	2.25	V
Misutilization of incentives	3.11	II	2.82	II
Lack of technical advice	2.98	III	2.20	VI
Meeting in convenient time and place	2.95	IV	3.92	X
Male members are dominating in the programme	2.90	V	1.90	XI
ADPs are not need based	2.86	VI	2.07	IX
Lack of consensus in taking decisions	2.82	VII	2.12	VIII
Non involvement of all the members in implementing the programme	2.81	VIII	2.85	I
Inadequate training	2.80	IX	2.6	III
Delay in implementing the programme	2.72	X	2.55	IV
Lack of credit facilities	2.63	XI	1.77	XII
There is no opportunity to express the ideas and views	2.60	XII	1.3	XV
Lack of appropriate technology	2.44	XIII	1.37	XIV
Problems in infrastructural facilities	2.40	XIV	1.65	XIII
Lack of uniformity among members	2.30	XV	2.125	VII

Women folk also found that there existed lack of consensus among the participants in taking a particular decision. Many of the decisions are taken according to political interest rather than meeting community needs.

Many of the respondent-women complained that non-involvement of all members while implementing the programme. Any development programme could be

implemented effectively only if the participation of all the members concerned were assured right from the time of planning to monitoring and evaluation of the programmes. Following are the other constraints viz. Inadequate training, delay in implementing the programme, lack of credit facilities, there is no opportunity to express the ideas and views, non use of appropriate technology, problems in infrastructure facilities, lack of cohesiveness among the members in their order of ranks.

Constraints experienced by women office bearers

A cursory perusal of Table revealed the constraints experienced by women office bears while undertaking the programmes. The constraint that ranked first was non involvement of all members in implementing the programme. Many of the women office bearers found that majority of them are not involved in the implementation of the programme. They feel that it is very difficult to work under such a situation. If any government programme could be implemented effectively, the participation of all the members are assured in all the stages of the programmes. In order to avoid the situation care should be taken to see that the entire members are included in the committee. Misutilization of the incentives is another constraint perceived by women office bearers, followed by inadequate training, delay in implementing the programme, political interference in selection of the beneficiaries, lack of technical advice, ADPs not need based, meeting at inconvenient time and place, male member's dominance, lack of credit facilities, problem of infrastructure facilities, non use of appropriate technology, lack of opportunity to express the ideas.

CONCLUSION

The study brings to focus the constraints experienced by rural women (rural women and office bearers) in Agricultural development Programmes under Peoples' Plan, which will help the planners in devising a suitable strategy for the effective participation of women in these programmes and these constraints identified should be given due consideration and necessary action should be taken by the planner in the coming years.

Training Programmes of KVKs: Opinion of Farmers

Mahendra Kumar* and I.M. Khosla**

Human resource development has become the priority area in developed and developing countries. Training is an important input in our development programmes. The human being constitute the most precious resource for development in any field, be it agriculture, industry, health, education, energy or any other. Krishi Vigyan Kendra (KVK) is an institutional project of Indian Council of Agricultural Research (ICAR) for testing, and transfer of agricultural technologies for the benefit of farmers, farmwomen and rural youths. The main purpose of organizing training programme is to provide new knowledge and develop new skills required for adoption of the latest technology and build up desirable scientific attitude among beneficiaries. Few evaluation studies have been done to know the status of various KVKs in the country. It is important to know the opinion of farmer trainees regarding various components of training programmes to improve the standard and quality of training programmes of KVKs. Hence it was felt necessary to analyse the opinion of the farmer trainees about the training programmes of KVKs in line with the objectives. An attempt was made to compare the opinion of the farmer trainees about various components of training programmes organized by Krishi Vigyan Kendras run by different agencies i.e. SAUs, ICARs and NGOs in Rajasthan.

METHODOLOGY

The study was conducted in Agro-Ecological Region (AER) two of Rajasthan state. There are 12 KVKs in AER-2, out of which, four KVKs were randomly selected; two from SAU, one KVK from ICAR institute and one KVK run by an NGO. A sample of 300 farmer trainees from selected KVKs was taken up for study. It was taken care that farmer trainees selected from each KVK was proportional to the number of farmer trainees attending training programmes at that KVK in the year 2002-03.

To assess the opinion of farmers about training programmes organized by different KVKs, a schedule was developed by the investigator for which a list of statements under eight aspects, i.e. "physical facilities", "Training facilities", "Course content", "Time and duration", "Evaluation and supporting", "Quality of trainees" and "Quality of trainers"

was prepared. The responses received from respondents were recorded on a five point continuum namely, "Most Favourable", "Favourable", "To some extent favourable", "Unfavourable" and "Most unfavourable" with a score of 4, 3, 2, 1 and 0 respectively as per the opinion of the experts. The responses of each respondent under each aspect were entered and considered as the score of opinion of that particular respondent about training programme. The data was collected with the help of a structured interview schedule by personal interview method. The collected data was coded, classified, tabulated and statistically analyzed which led to the following findings.

RESULTS AND DISCUSSION

The study revealed that in case of SAU-KVKs, majority of the farmer trainees (80.09%) had favourable opinion towards training programme, 19.91 per cent farmer trainees had more favourable opinion towards training programmes and some of the farmer trainees had least favourable opinion towards training programmes. In case of ICAR-KVKs, 52.63 per cent farmer trainees had more favourable opinion, 47.37 per cent farmer trainees had favourable opinion towards training programme and none of the farmer trainees had least favourable opinion towards training programmes. While in case of NGO-KVKs, majority of the farmer's trainees (80.49%) had least favourable opinion towards training programmes. About 20 per cent farmer trainees had favourable opinion and none of the farmer trainees had more favourable opinion towards training programme.

Hence, it can be concluded that majority of farmer trainees of SAU-KVKs and ICAR-KVKs had more favourable opinion regarding the training programme than the farmer's trainees of NGO-KVKs. The reason behind this might be that the SAU-KVKs and ICAR-KVKs were the oldest KVKs having good infrastructural facilities and well structured management system, so their training programmes were found better by the farmers than NGO-KVKs. Training facilities of NGO-KVKs were in developing stage. Thus, it can be suggested here that facilities regarding all the training aspect need to be taken care of in NGO-KVKs.

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Opinion of farmer trainees regarding various Components of training programme

Further the opinion of farmer trainees regarding different components was also studied. Their component wise opinion has been presented in Table 2.

The data in Table 2 show that regarding physical facilities, majority of the farmer trainees in KVKs under SAU (58.37%) had favourable opinion, 26.70 per cent farmer trainees had least favourable opinion and 14.93 per cent farmer trainees had more favourable opinion towards physical facilities. In case of ICAR-KVKs, majority of farmer trainees (73.68%) had favourable opinion towards physical facilities and equal percentage (13.16%) of farmer trainees in KVKs under ICAR had most favourable and least favourable opinion respectively towards physical facilities. Whereas, in case of NGO-KVKs, 63.41 per cent farmer trainees had favourable opinion towards physical facilities and remaining 36.59 per cent farmer trainees had least favourable opinion towards physical facilities.

Table 1: Opinion of farmer trainees regarding various components of training programmes in KVKs run by different agencies

Component	Opinion Levels	SAU KVKs N=221	ICAR KVKs N=38	NGO KVKs N=41
Physical facilities	Least favourable (Upto 19.43)	33(14.93)	5(13.16)	15(36.59)
	Favourable (19.43-29.37)	129(58.37)	28(73.68)	26(63.41)
	Most Favourable (Above 29.37)	59(26.70)	5(13.16)	0(0.00)
Training facilities	Least favourable (Upto 19.23)	26(11.70)	14(36.84)	19(46.34)
	Favourable (19.23-30.01)	144(65.16)	22(57.90)	22(53.66)
	Most Favourable (Above 30.01)	51(23.08)	2(5.26)	0(0.00)
Course contents	Least favourable (Upto 15.47)	13(5.88)	17(44.74)	21(51.22)
	Favourable (15.47-25.51)	165(74.66)	21(55.26)	20(48.78)
	Most Favourable (Above 25.51)	43(19.46)	0(0.00)	0(0.00)
Time and duration	Least favourable (Upto 3.86)	41(18.55)	5(13.26)	4(9.76)
	Favourable (3.86-9.96)	113(51.13)	31(81.58)	37(90.24)
	Most Favourable (Above 9.96)	67(30.32)	2(5.26)	0(0.00)
Evaluation & supporting	Least favourable (Upto 16.64)	23(10.41)	13(34.21)	19(46.34)
	Favourable (16.64-28.44)	148(66.97)	23(60.53)	22(53.66)
	Most Favourable (Above 28.44)	50(22.62)	2(5.26)	0(0.00)
Quality of trainees	Least favourable (Upto 8.85)	35(15.84)	8(21.05)	6(14.63)
	Favourable (8.85-14.51)	129(58.37)	28(73.69)	32(78.05)
	Most Favourable (Above 14.51)	57(25.79)	2(5.26)	3(7.32)
Quality of trainers	Least favourable (Upto 7.46)	24(10.86)	14(36.84)	9(21.95)
	Favourable (7.46-11.74)	121(54.75)	21(55.26)	29(70.73)
	Most Favourable (Above 11.74)	76(34.39)	3(7.90)	3(7.32)

The data in Table 1 also reveal that regarding training facilities, about 65.16 per cent farmer trainees in SAU-KVKs had favourable opinion, 23.08 per cent farmer trainees had most favourable opinion and rest 11.76 per cent farmer trainees had least favourable opinion towards training facilities. In case of KVKs under ICAR, 57.90 per cent farmer trainees had

favourable opinion, 36.84 per cent farmer trainees had least favourable opinion and only 5.26 per cent farmer trainees had most favourable opinion towards training facilities. Whereas, in case of NGO-KVKs, 53.66 per cent farmer trainees had favourable opinion and rest 46.34 per cent farmer trainees had least favourable opinion towards training facilities.

Efforts were also made to know whether the course contents were favourable or not favorable. The data in Table 2 reveal that majority of farmer trainees (74.66%) in KVKs under SAUs had favourable opinion towards course content, 19.46 per cent farmer trainees had most favourable opinion and only 5.88 per cent farmer trainees had least favourable opinion towards course content. In case of ICAR-KVKs, 55.26 per cent farmer trainees had favourable opinion and rest 44.74 per cent farmer trainees had least favourable opinion towards course contents, whereas, in case of KVKs under NGO, 48.78 per cent farmer trainees had favourable opinion and rest 51.22 per cent farmer trainees had least favourable opinion towards course contents.

Regarding time and duration of training programme, it was found that in case of SAU-KVKs, 51.13 per cent farmer trainees had favourable opinion, 30.32 per cent farmer trainees had most favourable opinion and 18.55 per cent farmer trainees had least favourable opinion. In case of ICAR-KVKs, majority of farmer trainees (81.58%) had favourable opinion, 13.26 per cent farmer trainees had least favourable opinion and rest 5.26 per cent farmer trainees had most favourable opinion towards time and duration of training programme. In case of NGO-KVKs, majority of farmer trainees (90.24%) had favourable opinion and rest 9.76 per cent farmer trainees had least favourable opinion towards time and duration of training programme.

Regarding evaluation and supporting activities the data presented in Table 1 reveal that in case of SAU-KVKs, 66.97 per cent farmer trainees had favourable opinion and rest 10.41 per cent farmer trainees had most favourable opinion towards evaluation and supporting activities. In case of ICAR-KVKs, 60.53 per cent farmer trainees had favourable opinion, 34.21 per cent farmer trainees had least favourable opinion and rest 5.26 per cent farmer trainees had most favourable opinion towards evaluation and supporting activities. In case of KVKs under NGO, 53.66 per cent farmer trainees had favourable opinion and remaining 46.34 per cent farmer trainees had least favourable opinion towards evaluation and supporting activities.

The data regarding quality of trainees show that in case of SAU-KVKs, 58.37 per cent farmer trainees had favourable opinion, 25.79 per cent farmer trainees had most favourable opinion and rest 15.84 per cent farmer trainees had least favourable opinion towards quality of trainees. In case of ICAR-KVKs, majority of farmer trainees (73.69%) had favourable opinion, 21.05 per cent farmer trainees had least favourable opinion and

rest 5.26 per cent farmer most favourable opinion towards quality of trainees. In case of KVKs under NGO, majority of farmer trainees (78.05%) had favourable opinion, 14.63 per cent farmer trainee had least favourable opinion and 7.32 per cent farmer trainees had most favourable opinion towards quality of trainees.

Regarding quality of trainers, it was found that in case of SAU-KVKs, 54.75 per cent farmer trainees had favourable opinion, 34.39 per cent farmer trainees had most favourable opinion and 10.86 per cent farmer trainees had least favourable opinion towards quality of trainers. In case of KVKs under ICAR, 55.26 per cent farmer trainees had favourable opinion, 36.84 per cent farmer trainees had least favourable opinion and 7.90 per cent farmer trainees had most favourable opinion towards quality of trainers. In case of KVKs under NGO, 70.73 per cent farmer trainees had favourable opinion, 21.95 per cent farmer trainees had least favourable opinion and 7.32 per cent farmer trainees had most favourable opinion towards quality of trainers. Hence, it can be concluded from the above findings that The opinion of farmer trainees about "Course content",

"Evaluation and supporting" and "Quality of trainers" was most favourable in SAU-KVKs, as compared to ICAR-KVKs and NGO-KVKs.

CONCLUSION

The opinion of majority of farmer trainees about training programmes of KVKs was most favourable for ICAR-KVKs, favourable for trainees of SAU-KVKs had favourable for NGO-KVKs. The farmer trainees of SAU-KVKs had favourable opinion about "Quality of trainers," whereas the farmer trainees of ICAR-KVKs least favourable opinion about "Physical facilities and training facilities." The farmer trainees of NGO-KVKs had favourable opinion about "Time and duration" and "Quality of trainees". It was suggested that cropping season rather than during the commencement of the adequate participation and application of knowledge in the ensuing season. Short duration refresher courses should be started on techniques of organizing training, preparation and presentation of audiovisual aids, journalism techniques, HRD techniques etc. to train the KVK trainers.

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Research Note

Constraints in Job Performance of Training Associates

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Transfer of technology through Krishi Vigyan Kendra (KVK) could lead to greater success in agriculture if they have adequate facilities in relation to the various aspects such as administrative, financial, technical, operational, personal & social facilities. These aspects are pre-requisite for successful performance of a job. Research reveal that the employees in different institutes do not have enough facilities to work. They are facing hardship in performing their job fully and effectively. They face many constraints while performing their job at Krishi Vigyan Kendras (KVKs). Accordingly a study was planned with the following specific objectives:

- To find out the constraints experienced by Training Associates (Home Science) in KVKs to perform the job.
- To study the association of constraints with job performance of TAs (H.Sc.).

METHODOLOGY

Out of a total of 261 KVKs, the study included 173 KVKs with TAs (H.Sc.) holding position along with their CTOs. Based on response received, the final sample consisted of 90 TAs (H.Sc.) and 80 CTOs. In view of the respondent groups, mailed questionnaire technique was considered. Questionnaire was developed consulting experts and literature consisting of general information, job inventory for quantitative analysis, job performance test for qualitative assessment and constraints. Constraints experienced by TAs (H.Sc.) in performance of their job were assessed through self and CTOs. A list of constraints was prepared and classified under 6 major aspects i.e. administrative, financial, technical, operational, personal and social. These constraints were assessed on a 4-point continuum as great extent (GE), some extent (SE), least extent (LE) and not at all (NA) with scores of 3, 2, 1 and 0 respectively. Data were analyzed using frequency, percentages, mean weighted scores and coefficient of correlation.

RESULTS AND DISCUSSION

A majority of the TAs (H.Sc.) belong to the age group of 30-40 years, were M.Sc. (H.Sc.) and had 5-10 years job experience and had received various kinds of training. Majority of the CTOs belonged to the age group of above 45 years, were Ph.D. and had the experience of 2-5 years.

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Regarding the job performance, in quantitative analysis on an average 72.2 tasks per cent) were being performed by TAs. Maximum tasks were performed in training, followed by other extension activities and linkage. In management and on farm, testing about 58 per cent and 40 per cent tasks respectively were performed. While qualitative job performance reveals that majority of TAs (43.3 per cent) were good in overall job performance and 40 per cent were average. Only few respondents (13.3 per cent) were in the category of poor job performance. However 2.2 per cent and 1.1 per cent TAs also exhibited very good and very poor job performance respectively.

Constraint experienced by TAs (H.Sc.) in job performances

The study revealed that out of six aspects the TAs faced social constraints to some extent (MWS 1.70) while in rest of the aspects the constraints faced were to the least extent. The CTOs perceived the constraints to least extent in all the aspects viz. Administrative, financial, technical, operational, and social.

The extent of the constraints faced by TAs in different aspects shows that more than 70 per cent TAs perceived various constraints either least or to some extent. Same pattern was found in the response of CTOs. Only a few TAs (3.3 to 4.4%) reported that they faced administrative, technical, operational and personal constraint to a great extent. About 17 per cent faced social constraints to a great extent while financial constraints were faced to a great extent by 9 per cent TAs. There were 13.3 to 23.3 per cent TAs who did not face any of these constraints. When the responses of a TA were compared with CTOs, it was found that 11.2 per cent CTOs also perceived the social constraints to great extent while 6.2 per cent CTOs agreed that financial constraints were faced to a great extent. Around 25 per cent CTOs reported that there were no problems in KVK.

Component wise in-depth assessment of constraints

Administrative constraints

Among various administrative constraints, the constraints reported to a great extent by TAs were lack of well equipped laboratory (38.9%), inadequate storage facility (33.3%), inadequate hostel facility (21.1%) and lack of proper policy for

promotion and transfer (33.6%). The CTOs were also in agreement regarding these constraints. Around one fourth of TAs also pointed out that the lack of classroom was a great constraint which was agreed upon by 20 per cent CTOs. Rest of the constraints were faced to a less extent by majority of TAs and also agreed upon by CTOs. Overall the major constraints were lack of well equipped laboratory, inadequate storage facility, inadequate hostel facility and lack of proper policy for promotion and transfer which needs attention of the authorities.

Financial constraints

The data in Table-I further reveals that the major constraints perceived by TAs to a great extent were lack of adequate budget for women activities (40%) and delay in flow of funds (31.1%). About one fourth TAs also perceived the constraints of poor inputs support and provision of honorariums for resource persons in farmwomen training, to a less extent. These constraints were also perceived by CTOs. Delay in payment of salary was not a constraint in more than 60 per cent KVKs. About 40 per cent TAs and CTOs did not consider the honorarium resource person, as a constraints.

Technical constraints

Data reveal that more than one fourth of TAs felt the constraints of lack of data specific package of practices in H.Sc., non-availability of resource person and lack of instructional material to a great extent. About one fifth of TAs also reported the constraints of weak linkage with research, poor library facility and duplication of work by other agencies as the major constraints. These constraints were also reported by CTOs to some extent. On the other hand about 50 per cent TAs had no constraint with regard to subject knowledge, practical experience, job training and handling A.V. equipment while 25 per cent CTOs considered the inadequate job training and poor skills in handling A.V. equipment as a constraint to some extent (Table-I).

Table 1: In-depth assessment of constraints of TAs (H.Sc) as perceived by self & CTOs

(GE- great extent, SE- some extent, LE- least extent, NA- not at all.)

Constraints	TAs (H.Sc) %				CTOs (%)			
	GE	SE	LE	NA	GE	SE	LE	NA
Administrative constraints								
Lack of communication with superior / subordinate	12.2	26.7	25.6	35.5	3.8	26.2	27.5	42.5
Unclear high targets	13.3	22.2	40.0	24.5	2.5	22.5	20.0	55.0
Negative attitude towards H.Sc. Activities	17.8	17.8	16.6	47.8	5.0	6.2	10.0	78.8
Lack of well equipped laboratory for H.Sc. Training	38.9	22.2	17.8	21.1	37.5	25.0	18.8	18.7
Lack of classroom	26.7	14.4	18.9	40.0	20.0	12.5	12.5	55.0
Inadequate storage facility (for equipment, instructional material, A.V. equipment)	38.9	22.2	17.8	21.1	37.5	25.0	18.8	18.7

Inadequate hostel facility	41.1	18.9	8.9	31.1	40.0	16.0	8.7	35.3
Frequent transfer of TA (H.Sc.)	8.9	4.4	12.2	74.5	10.0	8.7	8.8	72.5
Lack of Proper policy for promotion and transfer	35.6	18.9	13.3	32.2	23.7	16.3	11.2	48.8
Too many meeting	11.1	10.0	28.9	50.0	1.2	10.0	22.5	66.3
Too much report writing work	16.7	16.7	26.6	40.0	5.0	15.0	33.7	46.3
Financial constraints								
Lack of adequate budget for women activities	40.0	20.0	22.2	17.8	26.2	26.2	18.8	28.8
Poor input support for women programme	22.2	33.3	23.3	21.1	13.8	32.5	21.2	32.5
No provision of honorarium for resource persons in farm women training	26.7	14.4	18.9	40.0	26.2	22.5	12.5	38.8
Delay in flows of funds	31.1	23.3	21.1	24.4	22.5	26.6	20.0	31.3
Delay in payment of salary	13.3	13.3	13.4	60.0	7.5	6.2	13.8	72.5
Technical constraints								
Lack of subject knowledge	8.9	17.8	25.5	47.8	5.0	18.8	21.2	55.0
Lack of practical experience	7.8	14.4	24.5	53.3	5.0	22.5	26.2	46.3
Inadequate job training	18.9	18.9	13.3	48.9	10.0	25.0	32.5	32.5
Poor skills in handling A.V. equipment	17.8	14.4	16.7	51.1	12.5	25.0	26.2	36.3
Weak linkage with research	20.0	32.2	21.1	26.7	16.2	37.5	25.0	21.3
Lack of area specific package of practices in H.Sc.	30.0	23.3	23.3	23.4	17.5	28.7	26.3	27.5
Poor library facility	24.4	20.0	24.5	31.1	20.0	12.5	22.5	45.0
Non-availability of resource persons	26.7	23.3	18.9	31.1	13.7	20.0	22.5	43.8
Duplication of work by other ext. agencies	21.1	15.6	21.1	42.2	7.5	26.2	17.5	48.8
Lack of instructional material	26.7	23.3	25.6	24.4	17.5	26.2	30.0	26.3
Operational constraints								
Heavy work load	13.3	18.9	23.3	44.5	3.7	15.0	21.3	60.0
Lack of cooperation from staff	12.2	12.2	26.7	48.9	6.3	21.3	60.0	
Lack of clear mode of operation	16.7	18.9	31.1	33.3	3.7	13.8	32.5	50.0
Absence of systematic and planned schedule of work	13.3	17.8	26.7	42.2	6.2	17.5	21.3	55.0
Assignment of multipurpose roles	15.6	22.2	31.1	31.1	5.0	13.8	28.7	52.5
Lack of transport facility to visit selected area for field work	36.7	21.1	16.7	25.5	20.0	21.3	12.5	46.2
Lack of coordination between extension agencies	13.3	24.5	30.0	32.2	10.0	27.5	27.5	35.0
A.V. equipments remain out of order	23.3	14.5	13.3	48.9	7.5	13.8	16.2	62.5
Timely information is not available	17.8	20.0	26.7	35.5	1.2	26.2	18.8	53.8
Technical assistant not available	33.3	17.8	13.3	35.6	31.2	20.0	16.2	32.5
No freedom in decision making	17.8	20.0	24.4	37.8	8.7	16.2	18.7	56.2
Personal constraints								
Lack of command over local language	2.2	12.2	8.9	76.7	8.7	7.5	20.0	63.8
Lack of control over subordinates	7.8	8.9	15.5	67.8	2.5	17.5	20.0	60.0
Monotonous work	15.5	16.7	26.7	41.1	5.0	18.7	31.2	45.0
K.V.K. is far away from city	35.5	21.1	11.1	32.2	23.7	20.0	12.5	43.8
Problem in staying at village during Odd hours	16.7	17.8	15.5	50.0	27.5	18.7	25.0	28.8

CONSTRAINTS IN JOB PERFORMANCE

Worries of children as they are left uncared	30.0	23.3	7.8	38.9	16.2	17.5	23.8	42.5
Problem of children's education	31.1	22.2	8.9	37.8	18.7	21.2	15.0	45.0
Problem of medical facility	33.3	17.8	8.9	40.0	17.5	22.5	12.5	47.5
Housing problem	25.5	14.4	8.9	51.1	16.2	21.2	12.5	50.0
Lack of security due to single female staff	22.2	7.8	8.9	61.1	6.2	5.0	20.0	68.8
Social constraints								
Women do not come forward	27.8	34.4	20.0	17.8	20.0	27.5	27.5	25.0
Lack of interest and motivation among Women	18.9	42.2	21.1	17.8	12.5	37.5	26.2	23.8
Lack of support from male members of the community	28.9	26.7	23.3	21.1	16.2	26.2	25.0	32.5

Operational constraints

A considerable number of CTOs also perceived the constraints of non-availability of technical assistant (31.2%) and lack of transport facility (20%) as major constraints. Rest of the constraints i.e. heavy work load, lack of cooperation among staff, lack of clear mode of operation, absence of lack of coordination between extension agencies, timely information is not available and no freedom in decision making were faced to least extent according to majority of TAs and CTOs.

Personal constraints

Table-I further reveals that the major personal constraints expressed by the TAs (30% and above) were KVKs are far away from city, worries of children as they are left uncared, constraint of children's education and the constraints of medical facility with which few CTOs (16-24%) were also in agreement. According to 27.5 per cent CTOs, TAs have constraint in staying at village during odd hours. About one fourth TAs also reported the housing constraint and lack of security because of being single female staff as the main constraints.

Social constraints

Social constraints presented in Table-I reveals that majority of TAs and CTOs perceived to some extent the constraints of lack of interest and motivation among women and support by them as they do not come forward. These constraints were existing in majority of the KVKs & only about 20 per cent KVKs did not perceive any social constraint.

CONCLUSION

From this, it is clear that research system should evolve and circulate appropriate technologies for farm-women. Government or ICAR should arrange/provide educated infrastructure facilities which include well equipped laboratory, separate and adequate hostel for women trainees, separate transport facility, library with literature related to women activities demonstration unit and independent H.Sc. unit at KVK along with separate and adequate funds allocation for women programmes.

In order to bring improvement in the functioning of TAs (H.Sc.) at KVKs of India, a separate H.Sc. Cell at ICAR under extension division with all authorities from H.Sc. extension field like DDG, ADG, Director research, Director Extension and training at different zone should be established. Further a post of Technical Assistant at KVK and 2-3 field level workers for women programmes need to be created.

All these will facilitate in developing and understanding of H.Sc. component and women programme among the authorities at various level and will help in functioning of TAs (H.Sc.) at KVK adequately and effectively.

Cooking and storage practices followed by Tribals of Bastar

Rekha Singh and Arun Palta*

In the dictionary of Anthropology "Tribe" is defined as social group, usually with definite area, dialect, cultural homogeneity and unifying social organization. The primitive tribes of India have adapted to natural environments. Their economy, social institutions, beliefs, practices, and in fact their entire life style is an adaptation to their surroundings like hills, forests, plains, deserts, sea or their combination. The cultural pattern of each tribal community determines the nature and extent of food behavior found in the area. Some of the traditions followed blindly by the tribals may be good and should be preserved. Knowledge of their attitudes, traditional food and dietary practices, in general and in specific physiological conditions etc, is essential in planning appropriate nutrition and health education programmes intended for the tribals. The information available on the qualitative aspects of food processes adopted by the tribals is limited. Hence, the present study is an attempt to understand the cooking and storage practices followed by tribals of Bastar.

METHODOLOGY

The study was conducted in four blocks of district Bastar during year 2002. Selected blocks were Jagdalpur, Tokapal, Lohandiguda and Orcha. Total 200 respondents were selected randomly, which comprised of 100 Gonds and 100 Abujhmarias. Data was collected regarding their cooking and storage practices. An interview schedule was developed, pretested and used for the purpose of investigation.

RESULTS AND DISCUSSION

Cooking Practices:

Cooking practices of tribals are said to be unique. Tribes of Bastar prepare a beverage called "Pej" by boiling cereals/ millets with water for a long time. Abujhmarias tribe of Orcha block do not wash cereal/ millets before cooking, nor drain the water after cooking. Only few of them drain water after cooking which they give to their pigs, dogs and other pets. Cooking of rice/ millets/pulse with mahua flowers is also practiced by them. Similarly tribes of NEFA do not wash cereal/millets before cooking nor drain the water after cooking. Cooking of rice/ millets/pulse with mahua flowers is practiced by Bhils and Gond of Madhya Pradesh and Gonds of Andhra Pradesh. The staple food of tribals of Bastar is millets. It is a traditional habit of tribals to

consume the millets in gruel form as they care more for volume of food which readily fills the stomach. Three meal pattern is common. Boiling is the common method adopted in processing of foods. Flesh foods like dry fish and cattle meat is consumed weekly. Tribals of Bastar prefer sour taste to sweet taste. Specially Abujhmarias tribe is fond of sour taste therefore, red ant chutney is a delicious food item for them. Cooking vessels used by tribals are also different. Gond tribe of Bastar used utensils made of aluminum, steel as well as earthenware for cooking.

Majority of respondents from Block I (82%), Block II (97%) and Block III (71 %) used aluminium vessels (also called jerman) for cooking. In Block III 29 per cent respondents used steel vessels. This may be due to the fact that they were living near the market and had exposure to newer things and were also able to purchase steel vessels. Only few of them from Block I and II used earthenware where as Abujhmarias tribe of Orcha Block are the most primitive tribe of Bastar. They use only aluminium vessels and earthen pots for cooking. They live in dense forests and in their weekly markets only aluminium and earthen vessels are sold.

Storage practices

Tribals stored grains both for consumption and seed purposes. Abujhmarias tribe store their grains in a specially designed hut. This hut is built separately, just near their house. The storage hut is built about 3-5 feet above the ground level. Walls of the hut are made up of bamboo sheets and roof is made up of dried bamboo leaves. Inside the hut, there are large specially designed vessels made up of bamboo sheet mat coated with mud paste. Inside this grains are stored. These vessels have a capacity of 50 kg to one quintal. The storage structures used by Gond tribe of Bastar are earthenware, dried bamboo shoots, dried bottlegourd and tin drums for storing water.

Gond tribe of Bastar took water from near by ponds, rivers or well. Majority of respondents (55%) from Block I, stored water in dried bamboo shoots, majority of them (52%) from Block II stored water in earthenware pots while 35 percent respondents from Block III stored water in tin drums. Storage structures like dried bamboo shoots, dried bottle gourd, were used to carry water (pej) during travelling. Storage practices are quite common among them. Food grains were generally sun dried before storage. Storage structures used for storing grains were bamboo mat containers (baskets) earthenware and Gorla (Table I).

Table 1: Type of storage structures used for storing grains by Gond tribe of Bastar

Storage structures	Total respondents (n=100)	Block - I (n=33)	Block - II (n=33)	Block - III (n=34)
Bamboomat containers	64	20(60.60)	17(51.51)	27(79.41)
Earthenware	28	13(39.39)	11(33.33)	4(11.76)
Gorla	8	0(0.0)	5(15.15)	3(8.82)

(figures in parentheses are in percentage)

Majority of respondents from Block I (61 %), Block II (52%) and Block III (79%) used bamboomat containers for storing grains while others used earthenware and Gorla. Gorla is a type of storage structure made up of mud and straw. Some of tribals also stored variety of fruits, vegetables which they grew in their forest. Sundrying was the usual treatment adopted for preserving them. Among fruits mango and amla was dried while vegetables like brinjal, tomato, cauliflower, French bean, bamboo shoots and wild mushrooms were dried and used during off season (Table 2). Storage period of these items was about 1 to 6 months. Since tamarind is consumed every day by tribals (Gond and Abujhmarias) it was stored in bulk i.e. 15-20kg. Common method of storing tamarind was either as it is, or without seeds or by sprinkling salt water to the pulp and then sundrying. Another method commonly practiced was by adding salt (1 kg) and turmeric powder (250g) to 10kg of pulp and making it into small balls and then stored. Jagerry was stored in form of balls wrapped with Oak leaves and then stored in bamboomat baskets. Fish collected from ponds and the cattle meat were sun dried under unhygienic conditions and stored for off season. Similarly tribals of Andhra Pradesh stored cattle meat. Pieces of meat were strung on a fibre and tied over the fire place for drying. Dried pieces thus obtained are stored for a period of about a month in a pot.

Table 2: Practice of drying food stuffs by tribals (Gond and Abujhmarias)

Items	Frequency**	Average Amount	Period of storage
Mango	170		4-6kg, 6 months
Amla	90	5-10kg	3-4 months
Brinjal	70	4-5kg	2 months
Tomato	40	4-5kg	2 months
Cauliflower	30	5-6kg	3 months
Frenchbean	5	4-5kg	1-2 week
Maize	120	10-12kg	4-5 months
Bambooshoots	90	2-3kg	1-2 months
Jaggery	20	4-5kg	6 months
Fish	110	1-2 kg	1 month
Tamarind	200	15-20kg	6 months
Cattle meat	200	2-5kg	2-3 weeks
Red ants	200	250g-1 kg	1 month
Mahua	90	5-10kg	2-3 months
Sehadi seeds	100	2-4kg	2-4 months
Minor millet kosra	100	30-50kg	5-6 months

**multiple response

CONCLUSION

There is always a significant variation in the living habits of tribal and non tribal population. Most of the tribal economy is built around agriculture either shifting or settle, agricultural and allied labour, forest resources fishing and hunting. Cooking practices of tribals are said to be unique and the habit of storing excess food is more evident in the tribals living in the dense forests where more surplus can be collected. However since their food pattern is related to cycle of seasons, food storage practices among the tribals appear not to be very popular.

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