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THE INDIAN SOCIETY OF EXTENSION EDUCATION
Division of Agricultural Extension, IARI, New Delhi 110 012

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EDITORIAL

Evaluation Capacity Building among Extension Professionals

Programme evaluation has assumed greater significance in recent past since there is growing concern about the outcomes and equity. Cruciality of increasing the development aids for social well being in contrast with the reality of resources crunch has led to an increased competition among fund seeking agencies. This has resulted in greater expectations for efficiencies and accountability of performance from aid seeking organizations. Increased emphasis on result orientation as well as the growing need for improved management of research and development programmes has resulted in increase priority for Evaluation Capacity Building (ECB) in India. However despite the recognition that evaluation is an important programming function there has been no systematic effort of capacity building in this area. Only a few agricultural universities in India focus on programme evaluation. The evaluation skills of extension professionals are not adequate. Evaluation is a growing discipline. In recent years a significant advances have been made in methodologies, tools and techniques of evaluation. In spite of above scenario, only a few post-graduate programmes in agricultural extension offer special courses on programme evaluation. Further, most of the existing courses in evaluation are outdated and have not incorporated the latest developments. Thus, there is a need to develop and offer specialized courses on evaluation. It is heartening to note that the Division of Agricultural Extension of Indian Agricultural Research institute, New Delhi has designed new courses on impact assessment, and monitoring evaluation. These courses are offered to the post-graduate students of agricultural extension.

India spends millions of rupees every year on rural and agricultural development. Several new programmes on agricultural extension have also been implemented recently. For example the ATMA has been extended to all the Districts of India. In this context the programme administrators, the media and the public often question the viability and rationality of such programmes in relation to the huge budgetary allocation vis-à-vis pattern of utilization and as well as target achievement. Information about how the programme funds were utilized and what were the impacts of the programme are also sought by many. Increased funding of agricultural extension has also enhanced its accountability and the expectation of delivering relevant and quality services in time. To meet the demands of increasing expectations, it is necessary to update the extension professionals in conduction of evaluations and to take up corrective measures in light of evaluation findings. The need for enhancing the evaluation capacity building is not only limited to academic domain of extension but also extends to extension management and works of managers at various levels.

Realizing the growing importance of Evaluation Capacity Building, the research papers of evaluation and impact studies of extension programmes have been included in the present issue of IJEE. It contains ten research papers covering various areas of evaluation of extension programme like impact of evaluation capacity building programme of IARI, impact of radio farm school on poultry farmers, evaluation of Kisan Call Centres, impacts of Agricultural Technology Information Centres, evaluation of training programme, impact of KVK training programmes etc.

Apart from above papers on evaluation this issue also contains fifteen research papers and research notes covering a wide range of areas such as food values of hidden harvest, technical knowledge of camel management practices, information processing behaviour of farmers, motivational profile of farmers, factors of successful rural entrepreneurship etc. I hope that you will find time to read these papers to enrich you professional knowledge and practices.

In bringing out this issue my colleagues Dr R.N. Padaria, Dr. Premrata Singh and Dr. Rashmi Singh have rendered valuable help for which I am grateful to them. I also thank all the members of the editorial board for their scholarly contributions.



K. Vijayaragavan
Chief Editor

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Impact of Evaluation Capacity Building Programme of IARI

Baldeo Singh¹, Murari Suvedi², K. Vijayaragavan¹, R.N. Padaria¹ and Monika Wason¹

ABSTRACT

The Division of Agricultural Extension of Indian Agricultural Research Institute collaborated with the Centre for Evaluative Studies at Department of Community, Agriculture Recreation and Resources Studies (CARRS, Michigan State University (MSU) in undertaking an evaluation capacity building project. This paper is an attempt document, the experiences of IARI evaluation capacity building. A total of twenty participants were trained under the project which followed a workshop-based trainings along with inbuilt hands on experiences. The results of the impacts of the programme clearly indicated that the project resulted in significant gain in knowledge and skills among the participants on various areas of evaluation. The project also resulted in development of twenty cases on evaluation apart from a training module on evaluation.

We are in an era of accountability. The demand for program evaluation information is growing. Because the need to support local developmental programmes is increasing and the resources are limited, there is an increased competition among agencies. This has resulted in greater expectations for efficiencies and accountability reports of performance for organizations. Programme administrators, the media, and the public have become much more demanding about accountability and receiving quality services in return for public funding of programmes. The state and local officials, and other funding agencies are increasingly demanding information on how programme funds were used and what those programmes produced. Following are some examples of frequently asked questions by the stakeholders: We gave you Rs 500, 000 during last three years -what did your agency do with them?; We have supported your agency for the last 10 years, why should we continue this support?; Are the programs of your agency effective?; What are you doing to improve or terminate ineffective programs?; What new programs need to be developed to meet the needs and problems of the people you intend to serve?

Evaluation helps answer these questions. The main purpose of evaluation is to improve the quality of a

project by identifying its strengths and weaknesses. Evaluation is an important part of extension programming. Extension programmes, no matter how large or small, need to be reviewed or assessed to see if they accomplished the stated objectives. Through evaluation processes, we find out what impact the programme had on the audience. How did they react? What did they achieve? Was the programme worth for the time, money and resources? Should this programme be continued, expanded or terminated? Evaluations provide information for decisions concerning future programming. The information is useful to fine-tune the programme and it is used to communicate important facts to key individuals or groups who are concerned about our service. Evaluation results are useful for formal reporting.

Evaluation is an emerging discipline. Despite the recognition that evaluation is an important programming function, there has been no systematic effort of capacity building in this area. Not many universities offer programmes focusing on evaluation. Several developmental programmes have been utilizing expatriates for programme evaluation. As a result, local and indigenous perspectives are not taken into full considerations in programming efforts. Increased emphasis on result orientation as well as need for improved management of

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development and research programmes has resulted in more priority for Evaluation Capacity Building (ECB) in India. Further, several development agencies including World Bank are increasing their support for Evaluation Capacity Building. Effective monitoring and evaluation are needed for results-based management, as well as for learning and accountability.

There are no universities or institutions offering professional development training focusing on evaluation of rural resource management programmes in India. There is a shortage of a hands-on in-service course on outcome-based evaluation with emphasis on social, economic, environmental and quality of life impacts. Therefore, a project was designed by the Division of Agricultural Extension of Indian Agricultural Research Institute (IARI), New Delhi to address this educational need among programme managers and educators to conduct programme evaluations.

METHODOLOGY

The Division of Agricultural Extension of Indian Agricultural Research Institute, New Delhi collaborated with the Center for Evaluative Studies at Department of Community, Agriculture, Recreation and Resources Studies (CARRS), Michigan State University (MSU), USA. The main objective of this project was to develop evaluation capacity among rural resource management programme staff in India through development of a cadre of evaluators who will be willing and able to conduct evaluation of educational and/or developmental programmes through "train the trainer" approach. Specifically the project objectives were to undertake workshops on evaluation to enhance participants' knowledge and skills in determining the impacts/outcomes of educational programmes.

The project was administered by the Division of Agricultural Extension at Indian Agricultural Research Institute, New Delhi, India. The project consisted of four components

Component 1: Development of evaluation training module

Training module was developed based on the principles of adult learning or andragogy. Appropriate training methods and technologies were used for different types of learning such as cognitive knowledge, behavioral skills and development of awareness.

Component 2: Conduction of workshop

Workshops were conducted in three phases to impart training to twenty participants selected from both

Government and Non-Government sectors. The participants consisted of extension scientists of State Agricultural Universities (SAUs), ICAR institutes, and extension personnel of Krishi Vigyan Kendra's (KVKs).

Programme Activities : The project was a collaborative program between Indian Agricultural Research Institute (IARI), India and Michigan State University, USA. The training focused on hands-on evaluation with about 20 participants selected for the first session. Each participant was required to complete an evaluation project and share findings with the group. A set of handouts and evaluation training resources were made available to all the participants.

Workshop Schedule : The workshops were offered in a three-session format. There were built-in assignments between each session. The duration and contents of each session were as follows:

The first session (March 6-10, 2006): It was to introduce participants about the context of programme evaluation in India, evaluation concepts, and models and data collection methods. Each participant identified a project that he/she was to evaluate and drafted an evaluation plan.

Assignment: Each participant finalized the selection of the project to be evaluated, consulted with stakeholders, and developed a preliminary evaluation plan.

The second session (April 11-15, 2006): It focused on techniques of evaluation data collection. Emphasis was given on both qualitative and quantitative methods. The programme demonstrated the use of focus groups and participatory rural appraisal methods in evaluating educational programs. In addition, the session included evaluation data analyses (using Statistical Package for Social Sciences) and data interpretation.

Assignment: Each participant completed an assignment of collection, analysis and interpretation of data including preparation of the draft evaluation report.

The third session (August 21 to 25, 2006) reviewed the data analysis procedures and interpretation, and present strategies for sharing evaluation findings with different stakeholders. Participants presented the findings of their individual evaluation project.

Assignment: Each participant prepared and submitted an evaluation report to his/her agency based on this project, with a copy to IARI. In addition, participants were encouraged to publish the findings from their evaluation studies.

Component 3: Evaluation of workshop (training)

Evaluation evidences were collected to document the effectiveness of the workshop. To assess the impacts of the workshop, pre and post training data were collected. A reliable and valid questionnaire was used to collect these data.

Component 4: Finalization of training module on evaluation and cases materials.

Based upon the experiences of the workshop the necessary changes were made in the training module. The case materials submitted by the participants were revised in the light of suggestions and were finalized.

RESULTS AND DISCUSSION**Impacts of the workshop**

Improvements on Knowledge Level: In order to find out the impact of the programme on the participants' knowledge and skill a pre and post-test were conducted. The data in Table-1 show the knowledge score obtained by participants during pre and post-workshop test. It is evident from the data that as a result of the workshop, the knowledge score of participants rose to 74.9 from a level of 55 (the maximum possible obtainable score was 100) registering an increase of 36.18 per cent. According to the pre- test data, before the training: as much as 60 per cent of the extension professionals had poor (40-59%) level of competence, while 35 per cent of them had good (60-79%) level of competence and the rest of them (5%); had very poor (below 40%) level of competence. No one

Table 1. Impact of the workshop on improving knowledge level.

Item	Pre-training	Post training
Mean knowledge score*	55.0	74.9
Range	32 to 78	46 to 86
Standard Deviation	5.88	4.44
Very poor competency level (below 40)	5.0%	0.0%
Poor competency level (40 to 59 %)	60.0%	10.00%
Good competency level (60 to 79 %)	35.0%	55.0%
Very good competency	0.0%	35.0%

*Maximum Possible score was 100.

fell in the category of very good level of competence (80-100%). The post-training test revealed that as a result of training interventions through workshops, as much as 35 per cent of extension professionals belonged to category of very good level of competency (80 to 100%), while as much as 55 per cent of them were in category of good level of competence (60-79%) and only 10 per cent of them were in the category of poor level of competence. None of them belonged to the category of very poor level of competence. This clearly indicates the positive impact of the programme in improving knowledge and skills of the participants in evaluation.

Perceived areas of change in evaluation knowledge and skill :

The study further revealed that the extent of changes due to workshop was perceived by the participants to be at a very high level in all the areas of evaluation (Table 2). The average overall change score obtained by the participants was 4.12 out of the maximum obtainable score of 5. The greatest changes occurred in the area of "planning of evaluation" (score 4.6) followed by "preparing and presenting evaluation report" (score 4.22), "approaches to evaluation data collection" (score 4.1), "construction of questionnaire" (4.05 score) "understanding evaluation concept" (4.01 score).

Table 2. Perceived changes in knowledge and skills of the participants due to evaluation capacity building workshops.

S. No.	Areas of Change	Extent of Change score (Maximum score 5 and Minimum score 1)
1.	Planning an evaluation of a project or programme	4.6
2.	Preparing and presenting evaluation report	4.22
3.	Approaches to evaluation data collection	4.1
4.	Construction of questionnaire for evaluation data collection	4.05
5.	Understanding evaluation concepts	4.01
6.	Statistical analysis of data	3.96
7.	Drawing sample for evaluation study	3.90
	Overall change	4.12

Maximum score = 5; Minimum score = 1

"statistical analysis of data" (3.96 score), and "drawing sample for evaluation" (3.9 score).

New skills acquired: The study showed that all the participants had acquired several new skills due to evaluation workshop. A list of some of the most important skills acquired by the participants is given in Table 3. The participants perceived that new skills were acquired in the following areas in order of importance: "use of SPSS package in analysis of data", "planning evaluation", "Focus group method", "different models and approaches of evaluation", "report preparation", "analysis of data", "understanding evaluation concepts", "presentation skills", "data collection methods", "questionnaire preparation", "sampling technique", "study of impact", "ethics in evaluation research", "planning the field work", "drawing conclusion and implications", "preparation of project plan and budget", "writing research papers", and "computer operation skills".

Table 3. New skills acquired: Perception of the participants (N=20).

S.No.	New skills acquired due to the participation in the workshops	Percentage of the respondents*
1.	Use of SPSS Package in analysis of data	80
2.	Planning Evaluation	75
3.	Focus group method	75
4.	Different models and approaches of evaluation	70
5.	Report preparation	70
6.	Analysis of data	65
7.	Understanding evaluation concepts	65
8.	Presentation skills	60
9.	Data collection methods	60
10.	Questionnaire preparation	55
11.	Sampling technique	50
12.	Study of impact	50
13.	Ethics in evaluation research	45
14.	Planning the field work	45
15.	Drawing conclusions and implications	35
16.	Preparation of project plan and budget	35
17.	Writing research papers	25
18.	Computer operation skills	20

*Multiple responses

Suggestions for improvement : The participants of the workshops had given several suggestions for its improvement. The most important suggestion as pointed out by the 35 per cent of the participants was to reduce the number of workshops into two from the present number of three, but increasing the duration of each workshop to ten days each, instead of having a five - day duration at present for each workshop. The next important suggestion was to provide more practicals on SPSS package as many of the participants were not well versed with its use. The other suggestions were related to the need for having more emphasis on case study during the conduct of workshop, more exercises on project preparation and report writing, and making arrangements for field visits. One of the suggestions was related to arrangement for accreditation of the participants as professional evaluators, which will help them to apply for funding for projects, related to evaluation. There was also a demand for provision of a higher level of finance resources for field evaluation project.

Table 4. Suggestions for improvement (N=20).

S. No.	Suggestions	Percentage of respondents*
1.	To have two sessions (ten days each), instead of three sessions (five days each).	35
2.	To provide more practical on use of SPSS	25
3.	To provide more emphasis on case study	20
4.	To have more exercises on project preparation and report writing	15
5.	To arrange for accreditation of the participants as professional evaluators.	15
6.	To make arrangements for field visits	10
7.	To make provision for more finance resources for field evaluation project.	10

*Multiple responses

Project outputs and dissemination

Development of a cadre of twenty programme evaluators: The major output of the programme was the human resource development. The project helped in improving the capabilities of twenty extension professionals in programme evaluation capacity. We have already

received information from these trained participants that they have started conducting evaluation of educational and/or developmental programs through "train the trainer" approach. Some of them have received projects on evaluation of development programmes.

Knowledge creation: The project has resulted in development of a training module on evaluation that can be used as a resource material on evaluation by the trainers. The project has also resulted in development of 20 cases on evaluation of selected research and developmental projects, which will be resource materials for trainers and planners.

Project management

The over-all quality of the project management of the present project can be inferred from the responses of the participants who had given an excellent feed back about the overall conduct and usefulness of the project. The present project not only met but also exceeded the expectations of the participants. The administrative support received from Indian Agricultural Research Institute and Indian Council of Agricultural Research as well as Michigan State University was highly adequate and positive. The technical and administrative support provided by IDRC had been highly encouraging and praiseworthy. Through out the period of the project we witnessed a high level of motivation among the participants of this project. Further, the research and administrative staff involved in implementation of the project showed a greater level of commitment, hard work and enthusiasm. The team spirit and co-operation among the researchers had been praise worthy.

Other impacts

At Institutional level: At organizational level the project has contributed towards enhancing capability, credibility and reputation of Division of Agricultural Extension, I.A.R.I., New Delhi in the field of Evaluation Capacity Building. All the State Agricultural Universities and other organizations have recognized IARI as a "Knowledge Centre" in the field of Evaluation Capacity Building.

The linkage developed through the project with the faculty members of Michigan State University, U.S.A. has helped in sharpening the knowledge, skills and motivation of faculty members of the Division of Agricultural Extension in the field of evaluation.

The cases on evaluation of selected developmental programs have generated enormous data related to

evaluation, which has got a greater level of policy implications for improving future programs. The results of these evaluation studies will be communicated to the policy makers.

CONCLUSION

The results of the study and the feedback of the participants amply showed that the design was clearly charted, innovative and adapted to the needs of India in developing a cadre of twenty evaluation professionals. The results of the impact of the programme have clearly indicated that the project was perceived to be highly relevant, efficient and sustainable. The workshop-based trainings along with inbuilt hands-on experiences helped the participants not only to improve their knowledge but also their practical skills on various areas of evaluation. The project with a very limited funding for a brief period of twenty four months achieved a very high level of benefit in terms of human resource development, improving linkages among different institutions of India and production of educational and case study materials. The recommendations which can be made based on the experiences of the project are as follows:

Since the workshop based training program has immensely helped in improving the evaluation capacity of the participants, it is recommended that IDRC may consider funding similar projects which will cover participants from several developing countries. The present project had limited financial resources and was confined to the participants from India.

To further enhance project sustainability, IDRC may consider providing follow-up support to the present capacity building project with a provision of organizing regional workshops in different parts of India. The participants trained under the present projects may be associated in the follow up projects for its execution at various regional locations.

The IARI may consider an establishment of an Advanced Centre in Evaluation Capacity Building to undertake research and training programme in the area of evaluation capacity building.

The IARI may take up the responsibility of establishing a professional society of programme evaluators which will serve as a platform to help the members to undertake different professional activities including competing for constancy projects.

Knowledge, Attitude and Adoption Changes among Participants of Radio Farm School Programme on Backyard Poultry

P.V.K. Sasidhar¹, Murari Suvedi²

ABSTRACT

The data were collected from 74 participants and 60 non-participants of the sixth farm school programme conducted by Central Avian Research Institute, Izatnagar and All India Radio-Rampur. Key evaluation questions were on opinion, knowledge, attitude and adoption of changes in backyard poultry farming brought in by farm school programme. Overall, the evaluation found that a farm school on radio with registered participants can have a major impact by creating awareness, improving knowledge, change in attitude and involving end users in extension.

India's post independence experiments during Green and White Revolution periods have successfully used radio for disseminating outreach information to farmers. In spite of its proven role, India has not truly used the full potential of radio for extension activities. Similarly, research and outreach information can play a role in improving rural living standards and bringing affordable plant / animal food to all, yet the full potential of such research is not being realized because communication between scientists, extension staff, and farmers is weak (Maru, 2003). To bridge this gap, the Central Avian Research Institute (CARI), Izatnagar has initiated and completed six Farm School on All India Radio (FS-AIR) programmes in collaboration with AIR Rampur and Bareilly stations in an effort to support researchers in working together with radio broadcasters and rural poultry farmers.

The sixth programme 'Profitable Backyard Poultry Farming in Rural Areas' was broadcast by AIR Rampur. For this programme, CARI registered 1040 interested farmers from Uttar Pradesh and Ultrakhand States. Scientists of CARI prepared a detailed programme

with 13 serialized sessions on various aspects of backyard poultry. These sessions were aired weekly for 13 weeks. At the end of each session, three questions related to that session were asked and the participants were responded by post cards. A total of 169 registered listeners sent responses to questions for one or all of the 13 sessions. After evaluation, 15 prizes were distributed to the participants with highest scores. The lecture notes on the 13 broadcast topics were compiled, published and distributed to all the participants. The specific aim of this study was to evaluate the opinion, knowledge, attitude and adoption of changes in backyard poultry farming brought in by farm school programme among registered participants.

METHODOLOGY

The study was undertaken in purposively selected Rampur and Bareilly districts of Uttar Pradesh. The survey was conducted in eight villages - four (Loha, Bakaania, Rajpura and Gadaya) from Rampur and four (Agras, Girdharpur, Kargaina and Kilvipur) from Bareilly districts using a semi-structured interview

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schedule. For primary data collection, 169 programme participants were considered as respondents. All the eight villages were visited once to collect primary data by the personal interview method. But data were collected from only 42 participants out of 169, because all participants were not available at the time of data collection. Therefore, interview questions in the local language were sent with stamped reply envelopes to the remaining 127 participants and out of them 32 (25.2 per cent) responded. Thus the final sample size for registered participants was 74. Another 60 non-participants from the eight villages were interviewed for comparison. Secondary data were collected from office records. The measurement of opinion, knowledge, attitude and adoption of changes in backyard poultry farming are detailed below.

Opinion: Opinion of the participants on the farm school was obtained on six subcomponents viz., speed of presentation, relevance, audio quality, treatment of the message, adequacy of the content and usefulness of the content. "Speed of presentation" refers to the number of words broadcast per minute in each session. Scores of 1, 2 and 3 for "slow", "fast" and "appropriate" speeds were assigned. "Relevance" refers to the applicability of contents of the session. Scores of 1, 2 and 3 for "irrelevant", "somewhat relevant" and "highly relevant" were assigned. "Audio quality" is the understandability and comprehensiveness of the message of the session. Scores of 1, 2 and 3 for "poor", "fair" and "good" were assigned. "Treatment of the message" refers to the modification of the content into the local language with low use of technical terms for better comprehension and convenience to the audience. Scores of 1, 2 and 3 for "high", "moderate" and "few" technical words were assigned. "Adequacy of the content" refers to the ability of the session to provide all the necessary information. Scores of 1, 2 and 3 for "inadequate", "somewhat adequate" and "adequate" were assigned. "Usefulness of the content" refers to the worth /value of the sessions. Scores of 1, 2, 3 and 4 for "very little", "little", "much" and "very much" were assigned. The overall opinion score was obtained by summing up the scores of the six subcomponents and the participants were categorized into low (mean-SD), medium (mean \pm SD) and high (mean +SD) opinion categories.

Knowledge: It was operationalized as knowledge gained by participants on various aspects of backyard poultry through the farm school sessions. Knowledge of participants and non-participants of the programme was measured by asking 39 questions broadcast during 13 sessions. A score of one for each correct answer was

assigned to categorize respondents into low (answered up to 13 of 39 questions correctly), medium (answered between 14 and 26 out of 39 questions correctly) and high (answered 27 or more of 39 questions correctly) knowledge groups. To see the difference in knowledge of participants and non-participants, a t-test was applied.

Attitude: Attitude was operationalized as the degree of positive or negative feelings of participants and non-participants of the farm school towards backyard poultry farming. It was measured by using the scale developed by Rajkamal (1996). The scale consists of eight statements (four positive and four negative) and applied on a five-point continuum ranging from strongly agree to strongly disagree with weightage of 5, 4, 3, 2 and 1 for positive and 1, 2, 3, 4 and 5 for negative statements. On the basis of scores, respondents were categorized into unfavorable (mean-SD), neutral (mean \pm SD) and favorable (mean +SD) attitude groups. To see the difference in attitude of participants and non-participants, a t-test was applied.

Adoption: This refers to the adoption level of backyard poultry before / after farm school. On the basis of their responses, participants were categorized under three groups- "no plans to start backyard poultry", "rearing backyard poultry before listening to FS-AIR", and "started rearing backyard poultry after listening to FS-AIR".

Adoption of the tips: This refers to the adoption of tips after listening to the farm school by participants who were rearing backyard poultry. On the basis of their responses, they were categorized into four groups- "practicing prior to FS-AIR", "began practicing after FS-AIR", "intend to practice in the future" and "no plans to adopt".

RESULTS AND DISCUSSION

Participants' background

The majority of participants (63.51 per cent) were middle-aged, males (75.7 per cent) belonging to backward (47.3 per cent) and schedule caste/tribes (31.1 per cent). The majority (66.2 per cent) of participants belong to nuclear families and their occupations were largely agriculture (44.6 per cent) followed by livestock rearing (28.4 per cent). All of them were educated, and the majority (74.3 per cent) studied up to middle school or above (Table 1).

Opinion

Over half (55.4 per cent) of the participants reported the speed of the farm school sessions as fast. Nearly half (48.6 per cent) of the participants reported the contents of the farm school as somewhat relevant

(Table 2). Audio quality was reported as fair by 54.1 per cent participants. Moderate and high use of technical words in the sessions was reported by 43.2 per cent and 39.2 per cent of participants, respectively. Inadequacy of the content of the sessions was reported by 48.6 per cent of participants and little usefulness of the contents for starting backyard poultry was reported by half of the participants. Overall 77 per cent of the participants had a medium opinion on the farm school, 12.2 per cent low opinion and 10.8 per cent a high opinion.

Analysis of the broadcast speed of the sessions (Table 3) clearly supports the participants' views. The speed of sessions ranged from 96 to 298 words with an average speed of 208 words per minute. The desired speed of radio talk is 125 to 150 words per minute (Tabing, 2002). Out of 13 sessions broadcast, six were fast, three were slow and only four sessions maintained the desired broadcast speed. The speed of the speech is very essential to the clarity and understandability of the sound. Rural audiences lacking understanding of the subject need

accurate and controlled speed of the speech to comprehend the subject. Good quality audio increases understandability and comprehension of the message. This will be reversed if the broadcast topic contains high use of technical words. Therefore, before presenting any information, particularly to a rural audience, it is necessary to treat or modify the message as per the local language or convenience of the listeners. In rating adequacy and usefulness and in overall opinion on the sessions more than three-fourths of the participants are leaning toward the negative side. Sessions which don't provide full information about the topic are not useful for the audience. Therefore, messages broadcast through the farm school should provide all the necessary information related to the topic.

Table 1. Participants' background (N=74).

Variable	Categorization	Frequency	Percentage
Age	Young	14	18.92
	Middle	47	63.51
	Old	13	17.57
Gender	Male	56	75.7
	Female	18	24.3
Caste	General	16	21.6
	Other backward caste (OBC)	35	47.3
	Schedule castes/ schedule tribes (SC/ST)	23	31.1
Family type	Nuclear	49	66.2
	Joint	25	33.8
Occupation	Agriculture	33	44.6
	Livestock	21	28.4
	Livestock+agriculture	12	16.2
	Business	8	10.8
Education	Can read and write	5	6.8
	Primary schooling	14	18.9
	Middle schooling	31	41.9
	High schooling	16	21.6
	Graduate and above	8	10.8

Table 2. Opinions of participants on FS-AIR sessions (N=74).

Variable	Categorization	Frequency	Percentage
a) Speed of presentation	Slow	5	6.8
	Fast	41	55.4
	Appropriate	28	37.8
b) Relevance	Irrelevant	26	35.1
	Somewhat relevant	36	48.6
	Highly relevant	12	16.2
c) Audio quality	Poor	21	28.4
	Fair	40	54.1
	Good	13	17.6
d) Treatment of the message	High use of technical words	29	39.2
	Moderate use of technical words	32	43.2
	Low use of technical words	13	17.6
e) Adequacy of the content	Inadequate	36	48.6
	Somewhat adequate	25	33.8
	Adequate	13	17.6
f) Usefulness of the content	Very little	22	29.7
	Little	37	50.0
	Much	11	14.9
	Very much	4	5.4
Overall opinion (a+b+c+d+e+f)	Low (mean - SD)	9	12.2
	Medium (mean ± SD)	57	77.0
	High (mean + SD)	8	10.8
(Mean: 11.44; SD: 1.66; Range: 8-16)			

Table 3. Speed of the broadcast sessions of the farm school*.

Session No	Number of words broadcast in 10-minute talk/interview	Speed in words / minute	Desired speed of words / minute	Remarks
1	1409	141	125-150	Appropriate
2	1279	128	125-150	Appropriate
3	2313	231	125-150	Fast
4	961	96	125-150	Slow
5	1501	130	125-150	Appropriate
6	1530	153	125-150	Fast
7	1753	175	125-150	Fast
8	1942	194	125-150	Fast
9	1290	129	125-150	Appropriate
10	1641	164	125-150	Fast
11	2984	298	125-150	Fast
12	1026	103	125-150	Slow
13	1158	116	125-150	Slow
Overall	20,787	208	125-150	Fast

*Calculated by content analysis of radio scripts of the farm school.

Knowledge

Perusal of data presented in Table 4 reveals that half (50 per cent) of participants gained a moderate amount of knowledge (answered 14 to 26 of 39 questions correctly), 25.68 per cent gained a high amount of knowledge (answered 27 or more of 39 questions correctly) and 24.32 per cent gained low knowledge (answered fewer than 13 of 39 questions correctly). The corresponding knowledge levels for non-participants were 36.49 per cent, 24.32 per cent and 39.19 per cent, respectively. The mean knowledge and range of scores of farm school participants were higher than those of the non-participants group, and the 't' value revealed significant ($P < 0.01$) difference between them. The mean knowledge values and score range of participants and non-participants also confirms this result. Therefore, it is concluded that participants gained significant knowledge on backyard poultry farming through the farm school.

Attitude

About 56.76 per cent of the participants had a neutral attitude, followed by unfavorable (25.68 per cent) and favorable (17.56 per cent) attitudes towards backyard poultry farming (Table 5). The corresponding figures for non-participants were 63.51 per cent, 20.27 per cent and 16.22 per cent, respectively. The mean attitude score of farm school participants was higher than that of the non-

participants group. The 't' value between two groups also reveals a significant ($P < 0.01$) difference in attitude. Therefore, it is concluded that farm school participants benefited by a positive change in attitude on backyard poultry farming.

Adoption

Perusal of data presented in Table 6 indicates that no participant has started backyard poultry farming after listening to the farm school. Three-fourth of them has no plans to start backyard poultry in the near future. Twenty-seven per cent of them were already rearing backyard poultry before listening to the programme.

Data presented in Table 7 show that the farm school had some impact on participants who were rearing backyard poultry before listening to the farm school. Participants began shelter construction, supplementary feeding, regular egg collection, vaccination, natural hatching at home and monitoring for disease symptoms on a regular basis after listening to the farm school. This clearly indicates that a radio programme can create awareness, improves knowledge and change attitude, but it is difficult to change practice on a large scale. To change practice and promote poultry farming, relevant training interventions to impart skill components need to be undertaken immediately after the farm school.

Table 4. Knowledge level of participants and non-participants in FS-AIR.

Categorization	Participants (N=74)		Non-participants (N=60)	
	Frequency	Per cent	Frequency	Per cent
Low knowledge (answered up to 13 of 39 questions correctly)	18	24.32	53	71.66
Moderate knowledge (answered between 14 to 26 of 39 questions correctly)	37	50.00	21	28.4
High knowledge (answered 27 or more of 39 questions correctly)	19	25.68	0	0.0
Mean	20.7		11.2	
SD	7.9		5.2	
Range	6-36		1-25	
t' value	14.9** (P<0.001)			

Table 5. Attitude towards backyard poultry farming before and after listening to the farm school.

Categorization	Participants (n=74)		Non-participants (n=60)	
	Freq- uency	Per cent	Freq- uency	Per cent
Unfavorable (mean-SD)	19	25.68	15	20.27
Neutral (mean ± SD)	42	56.76	47	63.51
Favorable (mean ± SD)	13	17.56	12	16.22
Mean	29.08		25.03	
SD	6.33		7.4	
t' value	6.83**			
Significance	0.00			

CONCLUSION

The CARI experience with farm schools indicated certain benefits as well as measures to improve the programme. It shows that the use of radio has been the most powerful means of increasing the participation and involvement of the end users in extension. This has also been shown to be a much easier and simpler means of disseminating information and enabling farmers' participation in an organized manner and bridge the digital divide to a considerable extent. There is scope for increasing interactivity through radio phone-in programmes, inviting queries from farmers on the previous session and answering them in the subsequent sessions.

Table 6. Adoption of backyard poultry farming after farm school (N=74).

Response	Frequency	Per cent
No plans to start backyard poultry	54	73
Rearing backyard poultry before listening to farm school	20	27
Started rearing backyard poultry after listening to farm school	0	0

The lack of permanence weakness can be solved to some extent through the publication supplied at the end of the farm school to read and review the sessions. The scientific terminology is sometimes very difficult to interpret. Therefore translating messages into the local language with minimal use of technical words needs people well-versed in the language. A lot of training has to be undertaken, and this requires financial facilitation. To attract rural masses to farm schools, entertainment and education programmes are to be carefully mixed. To persuade participants to start poultry farming, training programmes related to the broadcast sessions with hands-on experience are to be conducted. Training programmes impart a skill component in addition to knowledge gained by participants in farm schools and may motivate participants to start poultry farming. Recording the scripts written by scientists with the voices of radio announcers can be considered for the straight talk mode of broadcast. This will improve the broadcast clarity and reduce the time wastage by scientists to travel to the radio station and

Table 7. Adoption level of the tips given by the farm school (n= 20)

Tips	Adoption level							
	Practicing prior to farm school		Began parting after farm		Intend to practice in future		No plans to adopt	
	F	%	F	%	F	%	F	%
Shelter construction	8	40	3	15	0	0	7	35
Low cost flooring material	10	50	-	-	3	15	7	35
Cleaning chicken house	8	40	-	-	6	30	6	30
Supplementary feeding	-	-	10	50	3	15	7	35
Ca supplementation for laying chicken	-	-	-	-	-	-	20	100
Providing water -	-	-	-	-	-	20	100	
Regular egg collection	8	40	12	60	-	-	-	-
Natural hatching at home	14	70	6	30	-	-	-	-
Treatment of sick birds	20	100	-	-	-	-	-	-
Monitoring for disease symptoms	-	-	2	10	-	-	11	55
Help from veterinary doctors	-	-	-	-	-	-	20	100
Sanitation in night shelter	-	-	-	-	-	-	20	100
Vaccination against RD	-	-	10	50	-	-	10	50
Selling chicken 20	100	-	-	-	-	-	-	-
Selling eggs -	-	-	-	-	-	20	100	
Egg products -	-	-	-	-	-	20	100	
Chicken products	-	-	-	-	-	-	20	100
Utilization of poultry waste	-	-	-	-	-	-	20	100
Record keeping -	-	-	-	-	-	20	100	

record the sessions. On the basis of the backyard poultry farm school experience on radio with registered participants, it could be concluded that radio contributes to creating awareness and knowledge, change in attitude, mobilizing community to adopt best practices, simplifying research findings by translating them into user language, and linking extension educators and researchers to farmers. The findings that emerged in this evaluation suggest that future farm school programmes need to be carefully identified, pragmatically planned and realistically broadcast in view of the unique features associated with disseminating outreach information through radio.

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Varietal Evaluation of Cowpea in Eastern Uttar Pradesh

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ABSTRACT

The performance of two varieties of cowpea namely Kashi Unnati and Kashi Kanchan, developed by Indian Institute of Vegetable Research, Varanasi was evaluated in farmers' fields. The varietal evaluation study showed that Kashi Unnati and Kashi Kanchan showed a higher performance as indicated by 90.66 per cent increase in yield over the traditional variety grown by the farmers. The new varieties also promised a higher economic returns.

Cowpea (*Vigna angularis* [L.] Walp.), which is commercially grown throughout India for its long green pods as a vegetable, for its seeds as pulse and for its foliage as fodder, is an important component of the farming system of the arid and humid tropics. Its cultivars grown for immature green pods are variously known as asparagus bean, snake bean or yard-long bean; when grown for dry and immature seeds they are known as black-eye pea, Kaffir pea, China pea or Southern bean.

In India, despite the fact that a large number of varieties/hybrids and agrotechniques have been developed, the productivity of cowpea has still not reached the desired level. Uttar Pradesh, the largest vegetable-producing state in the country in area and production, still has low productivity compared with some other vegetable growing states. A significant gap exists between the yields of farmers and experimental fields.

Frontline demonstrations (FLD) are one of the suitable approaches for disseminating technology generated in the research center. Under this unique programme, scientists are directly involved in conducting demonstrations at the farmers' fields then, with firsthand information of the problems related to the agricultural technologies, they can improve in formulating the

objectives and setting the priorities in their research programmes. Considering the importance of frontline demonstration, the Indian Institute of Vegetable Research, Varanasi, focused its efforts in disseminating improved varieties of cowpea (Kashi Unnati and Kashi Kanchan) developed by the institute by putting frontline demonstrations in farmers' fields in various districts of Eastern Uttar Pradesh in the past three years. The objectives of the present investigation was to compare the demonstrated crop yield performance with that of the existing cultivars.

METHODOLOGY

Locale of the study: For this study, vegetable FLD districts of Eastern Uttar Pradesh were selected.

Selection of district: Two major vegetable-growing districts of Eastern Uttar Pradesh, Varanasi and Mirzapur- were selected for the present study because of their area, production and the number of FLD by IIVR.

Selection of blocks and villages: Two blocks from each district were selected randomly to represent the scenario of vegetable production of the district. Thus the total number of blocks selected for the present study was four. Subsequently, five FLD villages from each block

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were selected randomly on the basis of area and production of cowpea crops.

Selection of farmers: A list of all the FLD cowpea growers for all the selected villages was prepared, one-third of the growers from each village were randomly selected for this study.

Development of questionnaire: An appropriate questionnaire was developed for required data collection, keeping in view the objectives of the present study.

Data collection: Required data were collected by regular monitoring of demonstration fields and personal interaction with the farmers with the help of a well-structured schedule developed for the purpose.

RESULTS AND DISCUSSION

Ages of growers

The study revealed that more than 50 per cent of selected cowpea growers are from the middle age group—i.e., between 30 and 50 years. That suggests that older farmers are giving the responsibility of farming to younger generation instead of carrying it themselves (10 per cent).

Education

Education of farmers plays a vital role in their understanding of the improved technologies of farming. The study reveals that the majority of the farmers are educated up to middle school level (45 per cent). However, 11 per cent of farmers are illiterate and 25 per cent just able to read and write. They require proper attention to understand the improved technologies.

Land status of cowpea growers

Rapid increase in population reduces the land-holding capacity of the farmers, as reflected in Table 1.

The data in Table 1 show that the majority of farmers in the Varanasi and Mirzapur districts of Uttar Pradesh have small to medium-sized land holdings—i.e., 1 to 5 hectares. Marginal farmers with land holdings of less than 1 hectare made up 11 per cent of the group selected for study.

It is quite impressive to observe farmers doing cowpea cultivation in good areas of land, despite small land holdings. The data in Table 2 reveal that 46 per cent of farmers are growing cowpea in areas of 0.5 to 1.0 hectare, and 85 per cent of farmers are growing FLD varieties of cowpea, Kashi Unnati and Kashi Kanchan, in areas of

Table 1. Cultivable land-holding status of cowpea growers.

(N = 100)			
Land holding (ha)	Category	Frequency	Per cent
Less than 1.0	Marginal	11	11
1.0-2.0	Small	38	38
2.0-5.0	Middle	31	31
More than 5.0	Large	20	20
Range		0.10-3.0	
Mean		3.53	
SD		2.82	

Table 2. Farmers' area in cowpea and FLD varieties.

Land area (ha)	Area in cowpea (ha)	Area in (ha) FLD varieties
Less than 0.5	32	44
0.5-1.0	46	41
1.0-2.0	18	15
More than 2.0	04	00
Range	0.10-3.0	0.10-2.0
Mean	0.96	0.80
SD	0.65	0.54

Table 3. Perceptions of cowpea growers of FLD varieties.

Perception	Maximum Possible score	Range	Mean	SD
Cowpea variety	18	11-16	13.00	1.13
Required cultural practices	21	12-19	15.30	1.65
Required plant protection measures	12	06-12	08.41	1.36
Cooking quality	09	06-09	07.05	0.96
Overall perception	60	38-51	43.83	2.76
Perception index			73.05	

less than 1.0 hectare. The average area planted in cowpea was 0.96 hectare, and the average area in FLD varieties was 0.80 hectare. The standard deviation in the above Table reflects the variation among the farmers in the area in the crop.

Farmers' perception of adoption of cowpea varieties under FLD

Adoption of any new technology by farmers is possible only if they have a positive perception of that technology that leads to final adoption. The study looked at farmers' perception of improved cowpea varieties developed by the Indian Institute of Vegetable research, Varanasi (U.P.). Results are given in Table 3.

The results presented in Table 3 reveal that the farmers have a quite positive perception of the demonstrated varieties (Kashi Unnati and Kashi Kanchan) by HVR. The response of farmers to all traits - variety, cultural practices, plant protection measures and cooking quality - shows satisfaction among the farmers with their adoption. The perception index of 73.05 also reflects farmers' positive perception of the demonstrated varieties, which resulted in quick adoption of these varieties by the farmers in larger areas.

Yield performance of cowpea under FLD

Yield of frontline demonstration (FLD) trials and potential yield of cowpea varieties were compared to estimate the yield gaps, which were further categorized

into technology and extension gaps. The adoption of technology in frontline demonstration trials was studied through the technology index, which shows the feasibility of the evolved varieties in the farmers' fields. The lower the value of the technology index, the greater the feasibility of the demonstrated varieties.

Table 4 reveals that Kashi Unnati and Kashi Kanchan are the cowpea varieties with the most potential in farmers' fields, as indicated by the 90.66 per cent increase in yield over the traditional variety grown by the farmers. The technology index of 10.64 shows the great feasibility for adoption of the varieties in the farmers' fields. This is also supported by the perception index in Table 4.

Economic scenario of cowpea cultivation

Any technology, irrespective of great feasibility, cannot be adopted until and unless it is economically viable. In the present study the economics of the technology were calculated and reported in Table 5.

The data reported in Table 5 clearly speak to the differences between FLD and traditional varieties in cost of cultivation. Farmers in this region are mostly growing

Table 4. Yield performance of demonstrated and traditional cultivars of cowpea.

Variety	No. of Locations	Yield (q/ha)			Per cent increase over traditional	Technology gap	Extension gap	Technology Index
		Potential	FLD	Traditional				
Kashi Unnati and Kashi Kanchan	100	18000	16084	8436	90.66	19.16	76.48	10.64

Table 5. Economic comparison of cowpea varieties.

Practice	Traditional varieties		FLD varieties		t - value	Sig. (2-tailed)
	Mean	SD	Mean	SD		
Seed cost	2019.00	289.88	2045.50	204.14	-0.803	0.424
Field preparation Cost	2596.00	253.73	1534.25	181.45	36.863	0.000
Fertilizer cost	3160.50	367.72	2108.00	313.07	23.489	0.000
Cultural practices cost	9418.00	1039.95	3018.00	303.72	58.529	0.000
Irrigation cost	2064.60	217.62	1261.25	116.63	31.698	0.000
Weed management Cost	1621.00	491.40	835.00	81.80	14.817	0.000
Plant protection cost	2705.50	488.45	1429.00	281.52	22.186	0.000
Harvesting cost	4673.00	467.93	2361.50	193.43	41.103	0.000
Total Cost of Cultivation	28257.60	1303.13	14642.50	589.28	94.775	0.000

pole-type cowpea, which has a high cost of cultivation and demands more labour. The FLD varieties of cowpea are bush-type plants. Because they are resistant to Golden mosaic virus and *Pseudocercospora cruenta* diseases, plant protection cost is subsequently less with them than with the traditional pole-type varieties. The t-value calculated also reflects the possibility of gaining more return with Kashi Unnati and Kashi Kanchan than with the traditional types. Overall, they appear suitable for the replacement of existing technology in cowpea.

CONCLUSION

Cowpea is one of the food legumes, an important source of nutrients and high quality, inexpensive protein to diets based on cereal grains and starchy foods. The Indian Institute of Vegetable Research so far has developed four improved varieties of cowpea— Kashi Shyamal, Kashi Gauri, Kashi Unnati and Kashi Kanchan. Selection of best technologies for farmers cannot be based solely on research station trials because the assumption of consistency or repeatability of technology performance between research station and farmers' field may not hold universally. Therefore, two varieties, Kashi Unnati and Kashi Kanchan were demonstrated in the farmers' fields of Eastern Uttar Pradesh the past three

years. Their performance is evaluated in the present study. Kashi Unnati and Kashi Kanchan are the cowpea varieties with the most potential in farmers' fields, as indicated by the 90.66 per cent increase in yield over the traditional variety grown by the farmers. The perception index of 73.05 reflects farmers' positive perception of the demonstrated varieties, which resulted in quick adoption of these varieties by the farmers in larger areas. The crop yield and economic returns calculated also indicate the possibility of higher returns from Kashi Unnati and Kashi Kanchan than from the traditional variety.

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Impact of The Agricultural Technology Information Centre of Central Marine Fisheries Research Institute : Success Cases

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ABSTRACT

The impact of Agricultural Technology Information Centre (ATIC) of Central Marine Fisheries Research Institute (CMFRI) was investigated through analysis of eight cases. These successful cases were related to different aspects of technology such as dry fresh processing, shrimp farming, conservation of marine resources, diagnostic services, promotion of finfish culture, farm advisory services and crab culture. The above eight cases showed that a remarkable professional achievement, increased earnings and employment resulted through the motivation and support provided by the ATIC of CMFRI.

The Agricultural Technology Information Centre (ATIC) of Central Marine Fisheries Research Institute (CMFRI) was established to provide a single window delivery system for the technological support available from the institute to fisherfolk and other interest groups under the funding of National Agricultural Technology Project (NATP) in 1999.

The CMFRI, one of the premier research institutes carrying out multi-disciplinary research in capture and culture fisheries in India functioning under the Indian Council of Agricultural Research (ICAR). ATIC acts as a bridge between the fisherfolk and scientists and thereby enhancing the linkage between the research and client system. It provides direct access to the farmers to avail the facilities from the institute at a nominal cost. The specific objectives are: (i) to provide a single window delivery system for the products and services available from CMFRI to the farmers and other clients, (ii) to provide a direct access to the fishermen to the institutional resources available in terms of technology advice and (iii) to provide a platform for feedback from the end users to the institute. The present study was undertaken to document success cases of impact of The Agricultural Technology Information Centre of Central Marine Fisheries Research Institute.

METHODOLOGY

Success case studies were elucidated from such fisherfolk who brought out a remarkable professional achievement, improved earnings and employment. Similarly Self Help Groups mobilized by various micro enterprises with the inspiration and support from ATIC also were taken into consideration for exploring the success cases.

RESULTS AND DISCUSSION

Technological products diagnostic service of ATIC

The technological inputs such as algal inoculums, zooplanktons and technological products such as shrimp feed, fresh shrimp meat, edible oyster meat, mussel meat, marine cultured pearls, sea weed products such as agar, jelly, pickles, value added fish products and dry fish products supplied by the self help groups of IVLP (Sathiadhas et al, 2003 & 2004) are the major items being sold through ATIC.

The major diagnostic services undertaken by ATIC include environmental monitoring, microbiological analysis, fish disease diagnosis, soil analysis, water quality analysis, feed composition analysis, electron microscopy works, fish and shell identification etc.

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Information input and farm advisory services

Information services were given on technologies available within CMFRI such as Scientific prawn farming, Crab farming, Mussel culture, Edible oyster culture, Pearl culture, Seaweed culture, Shrimp feed, Clam culture, Fish diseases, Small scale shrimp hatchery, Artificial fish habitats, Eco friendly prawn farming, Clam culture, Aquarium fish keeping, Marine fisheries management for Sustainable development etc. Some need based ICAR publications also are kept for sale in ATIC.

ATIC brought out some pamphlets such as Marine pollution, Seaweed recipes, Marine ornamental fishes, Self help groups in fisheries sector, Mud crab etc in three languages as technology information series for supplying to stakeholders at a nominal cost.

Technical services of ATIC

Awareness programmes and assistance to training on different technologies: ATIC organises awareness programmes on Responsible fisheries management and movie shows for assistance to training on different fishery based technologies to the clients from time to time.

Phone calls/Personal enquiry: Phone calls received are regularly attended and the enquiry is mainly for the technical information on prawn farming, crab farming, fish disease diagnosis, small scale shrimp hatchery, feed, seed availability of fish, prawns, crab and other farm advisory services.

Letters: Request letters in different languages are mainly received for algal inoculums, PCR test, stereo-microscopic works, electron microscopy, zooplankton, feed composition analysis and technological services. As much as possible the queries are answered through letter correspondence with ample support of leaflets and bulletins.

Website: The web site <http://www.aticcmfri.org> developed is widely in use by the public and it essentially covers the following information:

- (i) Package of practices of all the technologies developed by the institute.
- (ii) Schedule of training programmes organized by the institute.
- (iii) Value addition and post harvest technologies.
- (iv) Technological inputs and services available in the institute.
- (v) 'Ask the expert' facility in the web page whereby the questions of the farmers are sent electronically to the

ATIC and answers given by the concerned scientists is posted on the web page.

Successful cases

Dry Fish Processing: A case of women's self help Group at Elamkunnappuzha

'Janani' Self Help Group, Puthuyyppu Post, Elamkunnappuzha in Vypeen Island was conspicuous for the intervention of drying of fish through consultation of CMFRI. The group has 15 members and were engaged in the rack drying of fish. Drying of fish was not new to them since they were doing it on individual basis on a limited scale. They used to dry the fish in the traditional way. The President of Janani group, Mrs Chandramathi Appukuttan says that, she settled at Elamkunnappuzha village after her marriage 20 years back. She became a part of 13-member women-group in 1997. They used to make use of the market surplus of bumper fish catch for drying purpose. The operational cost was less, but they could get very less profit as the unhygienic practices followed at that time caused high amount of wastage of fishes. Most of the dried fish were taken for own consumption. They also engaged in door-to-door selling of the products. The dried fish was mostly marketed at the local market. She says that, "It is our luck that our group is selected by the ATIC of CMFRI for marketing of the dried fish items. With the advent of this programme and inputs of IVLP, we process first quality fish on commercial basis. The products are marketed well in good packing conditions, replacing our earlier paper packing. The training given by the Scientists from CMFRI on dip treatment under IVLP has increased our awareness regarding the hygienic method of drying fishes using 'calcium powder'. They also gave information regarding new marketing outlets. The 'special racks' that were provided for the drying of fish helped us in maintaining the fish products in good condition and reduced the, wastage of fish during processing. Now more and more people, especially women are coming forward to take up similar venture.

Shrimp Farming : A Farmer's success story at Elamkunnappuzha

Mr. Benny Figerado at Malippuram of Elamkunnappuzha is an active farmer who took up Crab Monoculture and Shrimp Farming based on CMFRI technology. Figerado, a matriculate, took around six acres of pond on lease for shrimp farming. Initially he was interested in active fishing and his father was an owner of two boats during 1980s. He could not sustain his fishing business for a long period as he met with heavy

losses. He shifted over to shrimp culture and his livelihood depended heavily on it. The shrimp culture practiced by him has improved over the years with the technical guidance given by CMFRI scientists through ATIC. He was made aware of the requirement of proper water exchange, farming, quality seeds for stocking, selection of uniform sized seeds, feed requirements and the feeding pattern in shrimp farming. The ATIC Sales outlet provided another opportunity for him to sell the fresh harvested shrimp at a reasonable margin. As the venture has boosted his morale to a great extent, he confidently says now that a reasonable profit can be generated through the supply of shrimp to ATIC and get good recognition and generate consumer preference for his farm produced shrimp.

Conservation of marine resources : A Case study of Theeram Turtle Protection Group of Kolavi Palam at Payyoli

Kolavi palam beach resorts of northern Kerala near Payyoli is popular for large gatherings of marine turtles during nesting seasons. A group of young nature lovers joined as 'Theeram Nature Conservation Society' and large number of newspaper clippings appeared about this dynamic group conserving the sea resources. The peculiarities of the 'nature conservation society' when become known everywhere, the Kerala Forest Department, Kerala Forestry Project, Habitat Management of Turtle, NGO's like Malabar Coastal Institute for Training, Research and Action (MCITRA), Central Research Institutes like CMFRI, IISR etc started intervention to make aware the public about the necessity of conserving and managing sea turtles. Soon, in 1992, the awareness programmes clicked and from 1998 onwards the Kerala Forest Department extended assistance by building up two hatcheries and sheds and providing lanterns, torches and daily wages to six members. From this year onwards the activities of the society began to be carried out in an orderly manner after legal registration. They developed it as a breeding location for turtles and they conserve the natural sea resources. The group contacted the ATIC of CMFRI for learning the principles of Responsible Fisheries Management, Protection and conservation of mangroves to retain the biodiversity and sustainability of ecosystem. All the information bulletins on Sustainable Fisheries management, FAO code of Conduct on Responsible Fisheries, Bulletins of National Conferences on Marine turtles and the pamphlets on fishery based technologies were supplied to them by ATIC. Interactive meetings with the fisherfolk were arranged with active involvement of scientists and technical hands of CMFRI through ATIC

in the Kolavi turtle nesting beach. The group members keep the statistics of the number of eggs hatched per nesting season. But most of the hatcheries disappeared due to severe sea erosion and the seashore breadth has reduced to 350 metres. In spite of all these impediments and obstacles, still the sincere efforts to conserve turtle by the group continues and more than 40,000 hatchlings were released in to the sea. (Vipinkumar, 2005) They expect a large arribada in the near future. The President of the group Sri. Surendrababu and Secretary Sri.Sureshbabu maintain contact ATIC of CMFRI for learning the technologies and putting into practice the principles of Sustainable management of marine resources. Interactive discussions with the active members of the group took place in ATIC and in the Theeram location on several occasions.

The group planted mangrove seedlings and they are being looked after by the group with extreme commitment for developing natural habitats. The group developed a nursery for forest trees of 35 different species with the help of forest department and about 30,000 seedlings are raised to develop it as a permanent infrastructure. They often organise awareness camps, project movies and conduct slide shows on nature protection and mangrove conservation.

Diagnostic services : A success case of Kaliparambi hatchery, at Chellanum

A well-known hatchery named, as 'Kaliparambi Tiger Prawn hatchery' at Chellanum is particularly notable for the production of tiger prawn seeds and is frequently in touch with the ATIC of CMFRI for the various consultations on technologies of shrimp production. The well-equipped hatchery possesses an area of 40 cents and gained significance in the supply of shrimp seeds on requirement of the farmers. Detection of white spot virus priorly is inevitable in shrimp hatchery and the hatchery Proprietor Sri. K.X.John and the manager Sri.K.S.George systematically do the diagnostic tests at the ATIC of CMFRI such as PCR test, appropriate water sample analysis, pH test, Water analysis for P_{H_2} salinity, dissolved oxygen and other environmental parameters, mud analysis etc. They approach ATIC for Algal Inoculum (Chaetoceros) for the feed purpose in the hatchery and are fully confident of the quality of Algal culture being supplied though the ATIC of CMFRI. The technician Sri.Sharavanan says that the production turnover is almost doubled in the last three years in this hatchery and they are thankful to ATIC for the diagnostic services offered at the right time.

Promotion of finfish culture : a farmer's success story at Puthuvypu

Mr. Karthikeyan at Thirunilathu of Elamkunnappuzha having primary level of education, was a regular visitor of ATIC for the technology on 'polyculture of finfish (*Chanos chanos* and *Mugil cephalus*)'. He entered into the field of fish culture during 1996, in his own farm. He owns 42 cents of land. The location was very bushy obstructing the inflow and outflow of saline water from the sea. This resulted in silt deposition and increase in weed population. The bushy land was cleared and deepened for culturing fish. He constructed temporary sluices in the eastern corner of the pond. No additional labourers were employed; rather the work was done by the family members. His wife Mrs Isha engaged herself fully in the farm operations. Natural entry of various species of gray mullets, pearl spot, milkfish was allowed. Apart from this, selective stocking of *Mugil cephalus* was also done at times. No specific stocking rate was maintained in such selective stocking. The economic returns were very minimal and were inadequate to make both ends meet. Irregular stocking and feeding pattern might be the reason for the low yield and less profit during those periods. He contacted ATIC and made use of the technologies by becoming a member of IVLP programme during 2001. He says that, "I was given training regarding different aspects of finfish farming and I learned the importance of maintaining sluice gates for the proper water exchange. Stocking of fish and their feeding pattern were followed as per the suggestions of Scientists. My income earning from fish culture has increased from Rs. 32,000 /- to around Rs. 55,000 /-. I could manage to provide good education to my daughters. With no doubt in my mind I proudly say that all this is possible only because of IVLP and ATIC of CMFRI."

Farm advisory services : A success case of water fry hatchery, at Kodungallur

Shyamal, aged 42, and his wife Saji aged 39 are graduates in Fisheries Science and they have grown as successful entrepreneurs in marine hatchery venture named as 'Water Fry' in Kodungallur. Shyamal started the entrepreneurial effort in hatchery business in 1997 from the experiences of marine hatchery named as 'Aquaplaza' in 1990 established as joint venture on partnership basis. Tiger prawn and Scampi are the major items of production here. 'Water Fry' possesses 30 million seeds/ year capacity and Shyamal is producing right now to the tune of 20-24 million / year. Initial investment through bank loan was 15 lakhs. The couple

solicited the cooperation and support of CMFRI scientists and were the regular recipients of algal inoculums and related farm advisory services. He employed a technician and 5 skilled labourers in the hatchery. Within a short span of time of about 9 years, the couple worked hard and they could reduce the bank loan amount to 5 lakhs. He has effluent treatment chambers installed by MPEDA's pilot project. Shyamal and Saji, the dynamic couple in hatchery business themselves have undertaken mass culture of algal inoculums such as *Thalassocera*, *Chaetoceros*, *Skeletonema* etc. and are producing up to 5 tonnes.

Crab culture & crab fattening : A farmer's success story at Malippuram

Sylvi Figerado (53) (Pathissery, Malippuram Po. Elamkunnappuzha) is a dynamic farmer who took up Crab Monoculture based on CMFRI technology. Figerado, a matriculate, took around 6 acres of pond on lease for shrimp farming. Initially he was interested in active fishing and he was an owner of two boats during 1980s. He could not sustain his fishing business for a long period as he met with heavy losses. His two male children were too young to support him economically during his difficult period. He shifted over to crab culture with the consultation of IVLP team of CMFRI. The regular farm advisory services on Crab culture and fattening were offered through the ATIC and his reluctance and negative attitude towards Crab farming was totally vanished. His wife Juliet aged 53, supported him in all his farming operations. They were aware of the requirement of proper water exchange, farming, quality seeds for stocking, selection of uniform sized seeds, farm requirements and the feeding pattern. In 2002 they earned a profit of 47, 000 /- from their pond in a single harvest. In the next lot they earned a profit of more than 50, 000 /-. That trend continued till date. Now the couple is confident that, whenever they are in need of money, they just sell crabs and get adequate amount all on a sudden. They proclaim that, crab farming is the best technology for obtaining maximum profit without much risk. Now Sylvi and Juliet have diversified the crab culture along with duck farming and vegetable cultivation in homesteads with bitter gourd and cowpea. The excreta of ducks became good organic manure for his homestead plot.

CONCLUSION

The eight success case studies were elucidated from such fisherfolk and self help groups show a remarkable professional achievement, improved earnings and employment with the inspiration and support from ATIC.

Formative evaluation of Kisan Call Centres in Tamil Nadu

C. Karthikeyan¹, K. Vijayaragavan² and P. Lavanya³

ABSTRACT

The Kisan Call Centre (KCC) scheme is a recent initiative in the field of information and communication technology in India. The scheme is operating at three levels in Tamil Nadu state. The methodology with which this study was conducted is formative evaluation through the logic model approach. Five indicators were developed for the study: awareness, participation, adoption, gratification and information sharing behaviour. The evaluation study reported that there was 23.3 per cent awareness among farmers about KCC. Agricultural magazines were the main source through which 29.79 per cent of the users became aware of the centre. More than three-fourths of KCC users had not adopted the recommendations of KCC officials, and more than half of the users were not satisfied with the overall services of the KCC. Even so, information about KCC had been shared with their peer groups by more than half of the users.

The success of the Green Revolution in Asia and the Near East indicates that giving rural communities access to knowledge, technology and services will contribute to expanding and energizing agriculture (Cohen, 1987). The technology dissemination system of India typically involves a top-down approach, in which scientists determine research priorities, generate innovations and provide the results to extension agents. Those results are then passed on to individual farmers on the assumption that it will encourage them to adopt the innovations. There is a need to connect rural communication, research and extension networks and provide access to the much needed knowledge, technology and service (Forno, 1998).

The latest advances in information technology (IT), computers, telecommunications and the Internet have provided a conducive environment for adopting new technologies and making the methods of instruction more effective and interactive. The telephone, the powerful

electronic machine that was a farmer's dream earlier, has become a reality, and farmers can immediately make use of it to address their field problems and other farm difficulties (Manhas *et al.*, 2005). In 1991, India had about 5.5 million telephones. At the end of August 2001, the total number of telephone lines in India was estimated to have increased to 33.8 million, and the number of rural telephone lines increased by approximately 35 per cent per annum during 1989-90 to 1999-2000 (Jhunjhunwala, 2005). With a view to leverage the extension telecom infrastructure in the country, the Department of Agriculture and Co-operation (DAC), Ministry of Agriculture (MoA), launched KCC's on January 21, 2004, across the country to respond to issues raised by farmers instantly in the local language.

At present, the call centres are operating in 13 states all over India. The call centre functions with a toll-free number, 1551, throughout the country, and each call goes to the centre from the state where, the call is made.

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Queries related to agriculture and allied sectors are being addressed through these centres (www.kisancallcentre.net).

Kisan Call Centre (KCC)

The KCC is a synthesis of two hitherto separate technologies- information and communication technology (ICT) and agricultural technology. To optimally utilize the strengths of both these systems, it was proposed to take full advantage of the professionally managed call centre mechanism and dovetail it with the specialized knowledge of agricultural scientists and extension officers (Subject Matter Specialists SMSs), so as to facilitate outreach to the farming community. The KCC consists of three levels. Level I is the basic call centre interface, with high quality band width and a local-language-proficient agriculture graduate. Level II has subject matter specialists on important crops and enterprises, connected through good band width telecom and computer connectivity. Level III is the management group, which ensures ultimate answering and resolution of all the farmers' queries that are not resolved at level II, connected on off line mode.

The logic model approach of the KCC scheme was done using formative evaluation. This process of evaluation looked at five indicators developed for the study: participation, awareness about KCC, adoption, satisfaction and information sharing behaviour of KCC users.

METHODOLOGY

The KCC's functioning in the state of Tamil Nadu was evaluated in this study. The KCCs were operating at three levels in the state, covering all the 30 districts of Tamil Nadu and two Union Territories, Andaman and Nicobar Islands and Pondicherry. For evaluating the resources, activities and performance of the KCCs operating in Tamil Nadu, all three levels of the KCC and 32 coverage areas were selected. The level I centre at the Dalmia, Samsung and Sony (DSS) Infotech Office, Chennai, and the level III centre at the Coconut Development Board (CDB), Chennai, were selected because these were the only centres operating at these levels. Six level II centres were spread throughout Tamil Nadu at the Commissionerate of Agriculture, Chennai; the Directorate of Horticulture and Plantation Crops, Chennai; the Commissionerate of Agricultural Marketing and Agri-Business, Chennai; the Tamil Nadu Veterinary and Animal Science University, Chennai; the Agricultural Technology Information Centre (ATIC), Tamil Nadu

Agricultural University (TNAU), Coimbatore; and the National Research Centre for Banana (NRCB), Trichy. Among these six level II centres, ATIC, TNAU, Coimbatore, was chosen because of the sex centres, it was the one to which the most calls were escalated. An observation guide was constructed to record the details on the resources and activities of all the levels of KCC.

KCC users were those who made at least one call to the centre. To assess the participation, information sharing behaviour, extent of awareness about the KCC, extent of adoption of the KCC recommend actions and the satisfaction with the KCC services, the callers of level I, level II and level III centres recorded during November 2004 to October 2005 were considered the respondents. The list of telephone numbers of the users of KCC had been collected from the level I centre and telephone numbers were randomly selected using the random number table. From the telephone number list of 35,853 callers to the level I centre, 150 samples were drawn randomly in such a way that five to six respondents were drawn from each unit of the coverage area of the KCC. From the sample of 150 callers, responses were obtained from 62 respondents only. Similarly, 75 samples were drawn from the total 1,136 callers to level II centres, in such a way that two to three respondents were drawn from each unit of the coverage area. Only 32 users responded out of the 75 samples. To determine the extent of awareness about KCC among the farmers, Namakkal district was selected, because it is located 100 kms away from one of the selected level II centres- ATIC, TNAU, Coimbatore. It was assumed that word of the effect of the ATIC, TNAU, Coimbatore, could have been spread to the nearby districts such as Coimbatore and Erode. Responses were obtained through a well-structured and prepared interview schedule.

RESULTS AND DISCUSSION

The five indicators developed for the evaluation of the KCC with respect to the logic model are awareness about the KCC, participation of the users of KCC, adoption of KCC recommended practices, the information sharing behaviour of KCC users and satisfaction with the services of the KCC.

Awareness about the KCC

Extent of awareness about the KCC: The extent of awareness about the KCC was studied in two dimensions. The first dimension is the extent of awareness about KCC among KCC users, and the second dimension is the level of awareness about the KCC by rural people.

Users' level of awareness about the KCC: Users were the people who were aware of the KCC and utilized its services. The users' level of awareness was analysed to find out the source of awareness of the KCC, the time of awareness and the frequency of contact with the KCC.

Source of awareness of the KCC: The sources through which the users had come to know about the KCC were studied. Possible sources included television, radio, newspapers and agricultural magazines.

From Table 1, it is clear that more than one-fourth (29.7 per cent) of the users became aware of the KCC through agricultural magazines, followed by television (21.28 per cent). The two agricultural magazines that promoted awareness of the KCC were Valarum Velanmai and Vivasayee. Television advertisements about the KCC had been aired twice a day, during morning and evening, and in Valarum Velanmai, an agricultural Tamil monthly magazine, the advertisement was run once per quarter continuously. The level III centre at Chennai had run advertisements in newspapers three times since the KCC started up. Friends, neighbours and relatives were the other sources through which awareness has been promoted. The results show that none of the users became aware of the KCC from the radio. It is appropriate to infer that regular and frequent advertisements may be run on FM radio, in newspapers and on television, which are the widely available sources for farmers.

Time of awareness of KCC: The time of farmers' awareness about the KCC affects their frequency of contact with the centre and utilization of KCC services and, thereby, their getting benefit out of it. It is obvious from Table 2 that the majority of the users had been aware of the KCC more than 10 months at the time of the survey. More than one-fourth of the users were aware of the KCC 5 months from the period of survey. This implies that many of the users became of the KCC during the initial stages of its establishment. It was learned that the users became aware from sources such as Valarum Velanmai and Doordarshan, in which advertisements might have been run frequently during the initial period.

Extent of awareness about the KCC by farmers: It is obvious from Table 3 that less than one-fourth (23.33 per cent) of farmers were aware of the existence of the KCC in TN. The rest were unaware of its existence in TN. This low level of awareness might be due to less promotion of the KCC in the villages where more farmers reside. Efforts need to be taken to promote awareness in such a way to reach all the people in remote areas, especially

Table 1. Source of awareness of the KCC (N=94)

S. No.	Sources of awareness	Number	Per cent (%)
1	Newspaper	10	10.64
2	Television	20	21.28
3	Agricultural magazines	28	29.79
4	Friends	11	11.70
5	Neighbours	7	7.45
6	Relatives and friends	8	8.51
7	Television and newspaper	4	4.26
8	Television and agricultural magazines	6	6.31
9	Radio	0	0.00
	Total	94	100.00

Table 2. Time of awareness of the KCC (N=94)

S. No.	Time of awareness	Number	Per cent (%)
1	Less than 5 months	26	27.65
2	6 to 10 months	32	34.04
3	More than 10 months	36	38.29
	Total	94	100.00

Table 3. Extent of awareness of the KCC among farmers (N=60)

S. No.	Extent of awareness	Number	Per cent (%)
1	Aware	14	23.33
2	Not aware	46	76.67
	Total	60	100.00

those from villages. Proper selection of media for creating awareness is the deciding factor in better reaching the people living in remote areas. It is clear that the existing level of awareness of the KCC among farmers is not enough for the KCC scheme to achieve its desired objectives. It is appropriate to find out whether the KCC recommendations had been adopted by the users after they became aware of and contacted the centre. The success of the scheme does not lie in creating awareness about the centre alone but should end with the adoption

of the KCC recommendations. Hence, an attempt was made to study the level of adoption of the KCC recommendations.

Participation of farmers in the KCC

Participation of farmers in the KCCs was considered one of the indicators for the study. The study on participation gives an indication about the extent of utilization of the services rendered by the KCC by people of both genders from various KCC coverage areas. Participation of farmers was stratified by their sex and the coverage areas to which they belong.

Participation of farmers by gender: The data in Table 4 shows that almost 100 per cent (99.62 per cent) of the calls were made by men. It is well known that, in our rural society, males have higher exposure to external situations than females. Even though females have a great deal of involvement in agriculture and allied fields nowadays, males are more likely to utilize new technologies and innovative approaches in transfer of technology. Moreover, the information need with regard to agriculture and allied fields is greater for men because of the decision-making power vested with them. Awareness, knowledge, exposure to the outside world and desire to utilize new technologies might be the reasons for much higher involvement with the KCC of men than women.

Extent of adoption of KCC recommendations

The extent of adoption is one of the indicators of the performance of the KCC scheme. The KCC users were categorized into "adopters" and "non-adopters" on the basis of their adoption of the recommendations by the centre. As Table 5 shows that, more than three-fourths of KCC users had not adopted the recommended activities of KCC officials.

Low adoption by the users might be due to irrelevant answers being provided by the officials, with which the users may not have been satisfied. All the KCC users who had contacted the centre would not have gotten the information they needed from the officials. The adoption of the recommendation might be related to the significance of the query and its seriousness which would tend to promote immediate adoption. It was heard from the farmers that advice on pests and diseases was immediately followed because of the seriousness of the problems and damage caused to the plants. Therefore, it could be inferred that adoption of advice could be promoted by the extent to which KCC officials provide quality recommendations to farmers based on the

seriousness of their queries. It is essential to get complete satisfaction from the recommendations and services of the KCC after adopting the advice or its use.

Satisfaction with KCC services

The findings on the satisfaction of users with the results of following KCC recommendations are presented in two dimensions.

Satisfaction with the results of adoption of KCC recommendations

If the KCC recommendations were found suitable to the farmers' condition and if the results produced positive impact upon the users, users were generally satisfied. When impractical and unsuitable information was provided by KCC officials without probing much into the farmers' situations, the results may not fulfill the users' needs and might leave them dissatisfied.

To determine about the extent of the suitability of and users' satisfaction with the advice of the KCC, the level of satisfaction was analysed (Table 6). The KCC users were categorized into "adopters" and "non-adopters" on the basis of their adoption of centre recommendations. From Table 6 it can be observed that the majority of the users were not satisfied with the results of the KCC recommendation. The reason for this result might be that the information provided by the officials was not suitable to the farmers at the field level. Hence, it may be inferred that location-specific, low-cost and high quality services need to be provided to make the users satisfied with the advices recommended by the KCC.

Satisfaction with the overall services of the KCC

Satisfaction with the overall services of the KCC is related to service timing, the delivery pattern of advice, recommendations and clarity in delivery of the messages. Table 7 shows that only 40.43 per cent of the users were satisfied with the overall services of KCC. More than half of the users were not satisfied. The reasons for users being unsatisfied were constraints in accessing the KCC, poor delivery pattern of the messages and the credibility of the KCC recommendation.

It could be observed from Tables 6 and 7 that more users were satisfied with the overall services of the KCC than with the results obtained as a result of adopting the advice of the KCC.

More effort needs to be made on educating the KCC officials of level I about recent technologies and their suitability in various locations so they can better

Table 4. Participation of farmers in the KCC by gender (N=36989)

S. No.	Sex	No. of calls made	Per cent (%)
1.	Male	36847	99.62
2.	Female	142	0.38
	Total	36989	100.00

Table 5. Extent of adoption of KCC recommendations (N=94)

S. No.	Category	Number	Per cent (%)
1	Adopters	20	21.27
2	Non-adopters	74	78.72
	Total	94	100.00

Table 6. Satisfaction with the results of KCC recommendations (N=94)

S. No.	Category	Number	Per cent (%)
1	Satisfied	29	30.85
2	Not satisfied	65	69.15
	Total	94	100.00

Table 7. Satisfaction with the overall services of the KCC (N=94)

S. No.	Category	Number	Per cent (%)
1	Satisfied	38	40.43
2	Not satisfied	56	59.57
	Total	94	100.00

need-based and location-specific information of practical utility to farmers.

The extent of users' satisfaction affects in the sharing of information about the KCC and its advice to peer groups. This should result in wide popularity of the KCC scheme and more participation by the desired clients

Table 8. Information sharing behaviour about 1551 (N=94)

S. No.	Category	Number	Per cent (%)
1	Shared	85	90.42
2	Not shared	9	9.58
	Total	94	100.00

Table 9. Information sharing behaviour about KCC recommendation (N=94)

S. No.	Category	Number	Per cent (%)
1	Shared	52	55.31
2	Not shared	42	44.68
	Total	94	100.00

Information sharing behaviour of KCC users

Information sharing behaviour of KCC users about the toll-free number and advice by the KCC represents the extent to which the users felt that KCC services should be enjoyed by all the members of the society. This sharing behaviour would normally occur once the users were satisfied with the services of KCC and felt their utility.

Information sharing behaviour about 1551

After the users became aware of the existence of the KCC, and were satisfied with its services, they can share information about the toll-free number, 1551. The following table shows that a vast majority of the users shared information about the KCC with others. Some farmer to farmer and peer group contacts should be made for promoting awareness of the KCC.

Information sharing behaviour about KCC recommendations

After becoming aware of the KCC and adopting its recommendations, the farmer would be either satisfied or dissatisfied with the results. If the results were satisfactory, there would surely be sharing of information about the KCC advice and its results.

As shown in Table 9, half of the respondents shared KCC recommendations. This directly reflects satisfaction of the users with the results of the advice

Hence, necessary steps need to be taken to provide quality advices at the level I centres* which are attending to most of the calls.

Number of persons who shared information about 1551

The total number of persons with whom the information about 1551 and the KCC recommendations were shared is given below in Table 10. Slightly more than half of the users had shared the information about 1551 with more than 10 persons. Desire to promote awareness of the KCC might be one reason for sharing the information with other farmers.

Above all, the KCC scheme offers a free service to the farmers by phone. To motivate the peer groups to utilize the free service, users shared the toll-free telephone number.

Number of persons who received shared information about the KCC recommendations

A majority of the users were found to share the advice with 6 to 10 persons (Table 11). Less than one-fifth of the users had shared the information about the KCC advice with more than 10 persons. This might be due to the users dissatisfaction with the result of adopting the advice of KCC.

SUMMARY AND CONCLUSION

The evaluation of five indicators revealed that the extent of awareness about the KCC scheme was low among the public. It was also found that agricultural magazines were the major source of farmers' awareness of the KCC. The adoption of the KCC recommendations was 20 per cent. Men and people from Erode and Coimbatore district participated most in the scheme. There was good information sharing behaviour among the users of KCC even though the extent of their satisfaction with the KCC's services was found to be very low.

The evaluation study suggests that it would be wise if the concerned authorities make efforts to build up essential infrastructure facilities to enhance the quality of services and farmers' participation. Serious efforts also need to be made to increase the public level of awareness about the KCC. This might be done by running frequent advertisements on all private television channels and on FM radio. Regular information about KCC the scheme

Table 10. Number of persons who received information about 1551 (N=85)

S. No.	Number of persons shared	Number	Per cent (%)
1	Less than 5	16	18.82
2	6 to 10	26	30.58
3	More than 10	43	50.58
	Total	85	100.00

Table 11. Number of persons who received shared information about the KCC recommendations (N=52)

S. No.	Number of persons shared	Number	Per cent (%)
1	Less than 5	20	38.46
2	6 to 10	23	44.23
3	More than 10	9	17.30
	Total	52	100.00

could also be given in newspapers. The importance and purpose of the scheme may be popularized by extension officers through personal contacts with farmers. These efforts can help make the KCC scheme become popular among the public and more usable by the farmers.

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Evaluation of FFDA Initiative on Freshwater Aquaculture in Orissa

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ABSTRACT

In the present study an attempt has been made to evaluate the impact of Fish Farmers Development Agency (FFDA) in increasing area as well as productivity of composite carp culture. The study was conducted in Khurda and Puri districts of Orissa. The study showed that the average yield has grown from 1.21 t/ha/yr. to 1.94 t/ha/yr., recording 60.3 per cent rise. Area developed under FFDA has increased four folds and two folds during 1995-2004 in Puri and Khurda district respectively. Institutional credit flow to fisheries has increased five and four folds in Puri and Khurda respectively during the same period. Farmers' perception about the quality of training programmes is not favourable. Poor growth, marketing problem, poor skill and water related problems are the constraints to aquaculture.

Fish is considered to be a favourite item for majority of people of eastern India. The per capita annual availability of fish is around 9.0 Kg in 1998-99 against 11 Kg, the ICMR recommendation. Freshwater aquaculture has recorded significant growth during last few decades. From 0.5 t/ha/yr. in 1950-51 the national average yield has gone over 2.6 t/ha/yr. in 1999-00. In several parts of India, aquaculture has acquired the status of an organised industry with the highest production of 13.2 t/ha/yr. recorded in a farmer's pond in Punjab.

In Orissa freshwater fish production has recorded significant rise. Its production has gone up from 0.58 lakh tonnes in 1990-91 to 1.70 lakh tonnes in 2004-05.

Fish Farmers' Development Agency (FFDA) (1974-75) initiated by Govt. of India to popularize fish culture as an alternative means of employment generation and removal of poverty. Under this scheme training is given to selected beneficiaries assisting in construction and renovation of the water resources, arranging credit facilities from Nationalized Banks, technical and input

support and finally helping in the marketing of the produce.

Presently 30 FFDA's are functioning in Orissa. By the end of 2004-05 about 54769 ha. of water body have been developed and 48396 fish farmers have been trained by these agencies to boost up production of fish. Average yield in FFDA tanks was reported to be 2.64 t/ha/yr.

Despite the efforts made by state machinery to transfer carp culture technology, it is observed that farmers are operating mostly in subsistence level. This explains why there is a huge gap between the potential yield and the actual yield farmers are getting. Pradhan and Sarma (1997) and Mishra and Mishra (1998) reported that farmers do not adopt the recommended practices. Sometimes recommended practices are adopted piecemeal or not adopted at all or adopted below or above the recommended levels.

The present study was conceived to assess the impact of FFDA initiative in freshwater aquaculture.

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Orissa. The specific objective was to assess the impact of FFDA in increasing area as well productivity of composite carp culture.

METHODOLOGY

The study was conducted in Khurda and Puri districts of Orissa. These two districts were purposively selected out of 30 districts of Orissa, because of time and resource constraints. All the beneficiaries of FFDA during 2000-2004 constitute the population for the study. List of farmers was obtained from District Fishery Office and a random sample of 41 farmers, comprising 15 farmers from Khurda district and 26 farmers from Puri district was drawn proportionately.

Level of satisfaction with training was measured with the help of a scale containing five statements covering aspects like course content, instructional methods, deliberation, hands on practice and relevant literature. A score of 5, 4, 3, 2 and 1 was assigned for responses like strongly agree, agree, undecided, disagree and strongly disagree respectively.

Perceived role of FEO and FFDA was measured with the help of a five point scale and a score of 5, 4, 3, 2, and 1 was assigned for excellent, very good, good, average and poor respectively.

A structured questionnaire was prepared to record responses of FFDA beneficiaries with regard to the services provided by FFDA. The schedule has been pre-tested among the fish farmers of nearby villages. The final schedule was administered among 41 respondents during May-July, 2006. The data were recorded in the final survey schedule.

RESULTS AND DISCUSSION

Area and productivity

Average operational area was found to be 1.81 acre. Secondary data indicate that area developed under FFDA has increased 4 fold and 2 fold in Puri and Khurda district respectively. With FFDA assistance more and more areas are coming under scientific carp culture both in newly excavated ponds and renovated old ponds.

Yield : Fish yield before adoption has been reported by 70.7 per cent of the respondents since the rest of the farmers have excavated new pond for culturing fish with the credit made available under FFDA. Mean yield before adoption was 1.21 t/ha/yr. Present yield level stood at 1.94 t/ha/yr., recording a significant rise. However, the average yield levels of Puri and Khurda district were 2.29

and 2.18 t/ha/yr. respectively. Maximum yield recorded in a farmer's pond in Puri was 4.49 t/ha/yr.

Data obtained from secondary sources indicate that FFDA, Puri has done tremendously well in bringing more area under scientific fish culture. Number of farmers benefited through FFDA has increased four folds during 1995-2004. FFDA, Khurda has excelled in raising the yield level. Average yield from FFDA tanks has grown from 1.3 t/ha/yr. to 2.18 t/ha/yr. a rise of 68 per cent.

Training in scientific carp culture

Ideally all the beneficiaries who get credit must undergo training in scientific carp culture. It was observed that 85 per cent of the respondents have undergone training. However, secondary data shows only 25 per cent and 47 per cent of the beneficiaries in Puri and Khurda districts respectively have attended training programs. When the investigator asked the FEO about this he replied " All beneficiaries were asked to attend the training, however 75 per cent and 53 per cent in two districts respectively did not turn up citing some personal reasons. We are trying to improve participation by linking credit release with attendance of training".

Scientific pond management for improving productivity and composite carp culture are the two important areas farmers were trained. Forty four per cent of the farmers were trained in carp culture and around 32 per cent of the farmers were trained in pond management. Most of the training courses (80%) were short term with duration ranging from 3-5 days. Only 20 per cent of the courses were of 15 days duration.

Department of Fishery (DOF) has been the main source (61%) for obtaining training by the farmers. However, Krishi Vigyan Kendra (Farm Science Centre) and Central Institute of Freshwater Aquaculture (a national research Institute under the Indian Council of Agricultural Research) were the other organisations from where 24 per cent of the respondents obtained training.

Training is one of the important functions of FFDA. Respondents were asked about the quality of such training programmes (Table 1). Training programmes scored low in terms of relevant literature and hands on practice. This is because large number of farmers is called for training and the department does not have adequate facilities to offer hands on practice to all the participants. Hence, the training imparted mainly through lectures failed to create the desired impact. However, on account of the course contents and deliberations the training programmes received a moderate score. Overall the training

Table 1. Level of satisfaction with training (N=35)

Components of training	Mean score	s.d.
Course contents	3.14	0.85
Instructional methods	2.17	0.66
Scope for deliberation	2.94	0.97
Hands on practice	1.86	0.84
Farm literature	1.69	0.63

*Mean score was computed based on a scale of 1=strongly disagree, 2=disagree, 3=undecided, 4=agree and 5= strongly agree

programmes need to be more focussed, having a combination instructional methods and it should offer opportunities for hands on practice.

Credit assistance from FFDA

Data obtained from secondary sources indicate that FFDA, Puri has done tremendously well in enhancing credit flow to fish culture. During 1995 only 31 applications out of 190 sponsored by the department of fisheries were sanctioned. In the year 2004, 111 applications out of 229 were sanctioned. FFDA, Khurda has also done well. Institutional credit inflow to aquaculture has recorded five-fold increase. Total amount of loan sanctioned by FFDA Puri and Khurda during 2004 was Rs. 87.00 lakhs and Rs. 47.57 lakhs respectively. Subsidy released by FFDA during 2004 was Rs. 9.009 lakhs and Rs. 7.23 lakhs respectively for Puri and Khurda.

Credit assistance received by the respondents ranged from twenty five thousand to eight lakhs. The average amount of credit advanced by banks for aquaculture is worked out to be Rs. 1.35 lakhs.

Forty six per cent of the respondents have repaid the loan in time. Others are in different stages of repayment. Bankers are also of the opinion that credit advanced for fish farming has excellent repayment status. In order to ensure that credit is utilized for fisheries purpose, bankers release the money in installments after verifying the extent of work done.

Adequacy, timeliness and procedure for obtaining loan

Amount of credit advanced for fish farming was adequate for 98 per cent of the farmers. This indicates that flow of institutional credit to fisheries has increased. Obtaining loan from bank through FFDA requires certain documents in place. Of late the bankers have simplified

the entire procedure. More than 80 per cent respondents have found the procedure easy and user friendly. Barring a few cases loan was made available in time. In some cases where there was some delay it is probably because of incomplete application put up by the farmers say the bankers.

Marketing assistance

After receiving credit and skill training for scientific farming the farmers would have to find a market for disposal of fish. FFDA is required to assist farmers in marketing fish. Here it failed. Fish farmers are left to find buyer themselves. Middlemen are taking advantage of this. Small scale fish farmers who cannot afford to take the produce to market resort to distress sale.

There is no organised system of marketing. The traders come with his own men and net. The harvest is sold by 95 per cent of the farmers at the pond site. From there fish reaches the consumers via few market intermediaries. More the number of intermediaries the more is the price spread.

Information seeking behaviour of farmers

More than fifty one per cent of the beneficiaries first learnt about FFDA from FEOs. Neighbours, other leading farmers are the sources of information for 27 per cent farmers whereas, 22 per cent of the respondents learnt about FFDA from mass media.

An average of 11 farmers visited those 44 per cent of farms constructed with FFDA assistance. Seven six per cent of the respondents reported that fellow farmers do seek their suggestion regarding fish farming. Information seeking behaviour reveals an interesting fact. Contrary to general perception that farmers hardly visit FEO, the data show that more than half of the farmers first seek information of fisheries from FEO. This fact is verified from the sources of information for knowledge about FFDA.

Role of fishery extension officer and FFDA as perceived by farmers

Fishery Extension Officers posted at the block level are the key functionaries of the department. He/she is the first contact point for any services related to fisheries to the farmers. FEO has the responsibilities to inform about the schemes, educate farmers in scientific carp culture, and provide technical backstopping. Similarly for FFDA too FEO has a great role.

Farmers first submit application to District office through FEO. He/she scrutinizes application, visits the site and recommends the case accordingly. During implementation of scheme FEO has to ensure that the farmer adheres to the principles of scientific culture. Weighted mean score of performance of FEO was 2.28. Low score indicate that fish farmers are not happy with the services of FEO. Farmers expect FEOs to provide them technical backstopping by frequent visits to their farms. FEOs are not solely responsible for this. 'We are finding it increasingly difficult to cater to the requirement of thousands of fish farmers in a block. We are also handicapped by lack of mobility owing to absence of vehicle and also diagnostic kits for soil and water testing' says FEO, Pipili.

Farmers rated FFDA's performance as good. Weighted mean score was 3.02. Perception of farmers about the contribution of FFDA has received a moderate rating. However, the difference in score in favour of FFDA is possibly because credit and subsidy is made available to farmers through FFDA.

Constraints

Twenty seven per cent of farmers indicate poor growth of fish as a constraint (Table 2). There could be several reasons for this says fisheries experts: i) impure seed; ii) high density stocking and iii) inadequate feeding. Fish is a highly perishable commodity. Market for its speedy disposal is a prerequisite for fish farming. Transportation also poses a problem for farmers. In the absence of organised market, farmers sell their produce to middlemen. At times they are being deprived of remunerative price. While the consumers pay Rs. 75-80/Kg the farmer gets only Rs. 45-50/Kg. Technical knowledge and skill of fish farmers (17%) is found to be poor. Surveys indicated that majority of fish farmers follow age old practices and as a consequence they get very low yield (sometimes below 1 tonne/ha/yr.). Mukhopadhyay *et al.* (1989) also reported that the farmers practicing rice-fish culture lack systematic knowledge on fish farming.

Water related problems are surfacing as a new constraint to aquaculture. The quality of water, availability of water for aquaculture and at times flood are cited as constraints by 12 per cent of the respondents. Poaching and poisoning are also indicated by the farmers as social problems, hindering aquaculture operation. Chakraborty (1993) reported deliberate poisoning and illegal poaching

being encountered by farmers of Burdwan, West Bengal.

Suggestions

Farmers emphasized mainly two things that they expect FFDA to do (Table 3). First is to provide more credit. Thirty nine per cent farmers would like to avail another loan through FFDA for expanding their business. Twenty nine per cent farmers opined that focussed skill training would greatly benefit them. One respondent sought exposure visits to other states where aquaculture has taken the shape of an industry.

Outlook

Seventy one per cent of the respondents would like to continue fish farming and 29 per cent of the farmers would go for expanding the business. All the respondents surveyed by the researcher would recommend friends and other farmers about FFDA. This indicates that FFDA is a highly popular scheme among the farmers.

CONCLUSION

The study suggests that skill training for the farmers need to be strengthened. It is also desirable to improve level of participation of both male and female fish farmers in the training programmes. Exposure is to be given to farmers in newer technologies e.g., prawn farming, ornamental fish rearing, catfish rearing etc. It has

Table 2. Constraints of fish farmers (N=41)

Constraints	Frequency	percentage
Poor growth	11	26.8
Marketing	8	19.5
Technical skill	7	17.1
Water related problems	5	12.2
Poaching	2	4.9
Misc.	2	4.9
No constraints	8	19.5

Table 3. Suggestions (N= 41).

Suggestion	Frequency	Percentage
Organise more skill training	12	29.3
Provide more credit	16	39.0
Organise exposure visits	1	2.4
No suggestion	12	29.3

become imperative to culture diversified fish species since consumer preference is shifting towards these high value fishes. FFDA has to strengthen the freshwater fish marketing infrastructure. Transportation, cold chain, market intelligence, value addition are some of the areas FFDA must pay attention to. Cooperative structure (three tier) of AMUL could be replicated in freshwater aquaculture. Services rendered by FEO have to undergo qualitative changes. On the whole FFDA is a popular scheme among the farmers.

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Evaluation of Training Programme On Mushroom Cultivation

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ABSTRACT

The study is an attempt to investigate the effectiveness of training programmes on mushroom cultivation undertaken by Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. It was conducted in Akola district among 120 trainees. The investigation revealed that about 70 per cent of the topics of mushroom training programme were perceived to be either relevant or highly relevant. Also about 74 per cent of the respondents rated the topics of the programme either as most useful or useful. The topics such as cultivation of oyster mushroom, bed setting and spacing, and sterilization of straw received a high mean score for relevance and utility. About 77 per cent of the respondents perceived the programme either effective or highly effective. About 55 per cent of the trainees were confident enough to start mushroom cultivation after the training.

The scenario of the mushroom production in our country is far from satisfactory. The total production of mushroom during 2003-04 in India has been estimated to be 70,000 tons, bulk of which is exported out. The commodity is hardly available to the Indian consumers except in some metropolises like Delhi and Mumbai and that for a very limited. Thus, mushrooms have remained more or less confined to the star hotels of the country and they throw a real challenge to the research and development agencies to bring in desired growth in their production and productivity. Although, some spurt in its growth has been felt particularly during the last five years or so, but with the vast opportunities both at the international and national levels lying at the door steps of India, nothing less than a mushroom-revolution in the coming decades will help to achieve the targets.

To tackle this issue at global level, strengthening to state and national research systems in developing countries will have to be taken into consideration. State Department of Agriculture of different states, State Agricultural Universities and Krishi Vigyan Kendra's are organizing variety of training programmes on mushroom

cultivation to popularize this commodity and to promote mushroom growing as an enterprise for rural development.

The scientists working under Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola provide training and skills on different aspects to the farmers, so that the knowledge of the farmers about various aspects of latest technological recommendations may increase. The training programme on mushroom cultivation is one of the prestigious training programmes of the University being conducted since 1999 regularly. The funds of Rs. 40.40 lakhs were allotted to the Department of Plant Pathology for establishment of spawn production unit and pasteurized compost unit. The Department of Plant Pathology is organizing one day training programmes on mushroom cultivation since 1999 with the major objective of imparting practical skills to the young farmers in mushroom cultivation. The scientists of Dr. PDKV provide the training with the help of lectures, practical and skill demonstrations to the farmers to increase their knowledge about various mushroom cultivation techniques, but the adoption of this technology

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is not satisfactory.

During the last eight years, the course content of this training programme is in its original form with addition / deletion of new / old aspects related to mushroom. The systematic evaluation of the course content has not been conducted till now, except overall feed back during post training discussion.

The present study was therefore undertaken with the specific objectives of investigating the extent of effectiveness of training programme on mushroom cultivation in terms of utility of topics taught and their adoption.

METHODOLOGY

The study was carried out in Akola district of Maharashtra. Out of six Panchayat Samiti, one Panchayat Samiti namely, Akola was purposively selected because of participation by larger number of trainees in the training programme.

Selection of villages : Akola Panchayat Samiti comprises of 196 villages. Out of these, 6 villages were selected purposively on the basis of dense population of the trainee participants in the training on mushroom cultivation organized by Dr. PDKV, during the preceding year that is 2005.

Selection of trainees as respondents : The list of the trainees participated in the training programme was obtained from the Department of Plant Pathology. Total 267 trainees were participated in training during 2005. Out of these 202 trainees were from Akola Panchayat Samiti. A sample of 120 trainees was drawn by resorting to disproportionate random sampling method, which constituted the sample for the present study.

Keeping in view the objectives of the study, a well structured interview schedule was prepared. The schedule was designed with relevant questions or statements by referring available literature and information obtained from the training institute. For data collection, trainees were interviewed personally in their respective villages.

RESULTS AND DISCUSSION

Personal profile of respondents : Personal attributes like age, education and occupation were selected for this

study. The study indicated indicates that 51.09 per cent of the respondents belonged to age group between 26 to 35 years. Whereas 55.43 per cent of respondents had education upto college level. In case of occupation, 52.17 per cent respondents had an occupation of farming. Thus, it is inferred that mostly educated farmers were interested in participation in the training programme. It might be due to the fact that they were interested in acquiring skills and knowledge gain in training and to use it in actual field situation to generate additional income generation.

Motives : Respondents were asked to state their motives in joining the training on mushroom cultivation. The study showed that 30.43 per cent of respondents joined the training to adopt mushroom growing as an occupation, 16.30 per cent respondents wanted to get certificate of the training course, 13.04 per cent respondents participated in training for gaining knowledge about mushroom cultivation. The respondents joining the training to establish linkage with agricultural university, for using the empty space of farm or house, employment generation for self and family members, to use in the daily diet were statistically negligible. Hence, it is heartening to note that the majority of participants joined the training with the self actualization motive.

Relevance of course contents covered : Data with regards to the relevance of course contents covered in training as perceived by trainees have been depicted in Table 1.

The data in Table 1 reveal that the topics such as cultivation of oyster mushroom and teaching material shared were perceived to be highly relevant. The percentage of respondents under this category ranged between 11.96 to 76.09 per cent.

The topics such as spawn growth, fruiting bodies, input requirement, climatic requirement, sterilization of straw, bed setting and spacing, cropping and harvest, yield of mushroom, storage of mushroom, marketing of produce practicals regards to insect, pests and diseases and their control were perceived to be quite relevant. While the topic viz., fruiting bodies were perceived to be highly relevant and quite relevant in equal proportion i.e. 29.35 per cent.

The topics such as yield of mushroom, bed setting

and spacing, storage of mushroom, sterilization of straw and fruiting bodies were perceived relevant by 34.78, 26.09, 25.00, 23.91 and 21.74 per cent respectively.

The topics such as fruiting bodies, input requirement and marketing of produce were perceived as somewhat relevant by 10.87, 17.39 and 13.04 per cent of trainees respectively.

Among the topics covered, input requirement and marketing of produce were perceived not relevant by 14.13 and 16.30 per cent respondents respectively. Among the practicals conducted, cultivation of oyster mushroom were perceived highly relevant by majority of the trainees.

It could therefore be inferred that a very few topics were highly relevant as perceived by the trainees (32.69%) whereas most of the topics were perceived to be quite relevant by the trainees (37.29%).

Utility of topics : The total items of usefulness of the topics of training on mushroom cultivation numbering to 10 were administered to the trainees and their responses were elicited on the three point continuum such as most useful, useful and least useful with the score of 3, 2 and

1 respectively. Thus the total score was worked out and categorization was done on the basis on mean and standard deviation.

The data in Table 2 indicated that 58.70 per cent trainees perceived topics covered in training useful. One fourth of respondents (26.08%) perceived it as least useful whereas 15.22 per cent respondents felt the topics taught were most useful.

Thus, it could be inferred that the respondents perceived utility of the various topics to useful level. This perception need to be changed among the trainees so as to have with them the cultivation of mushroom as a subsidiary occupation for earning additional income and provide employment opportunities to themselves and other.

Utility of topics covered

Data with regards to the utility of topics covered in the training programme on mushroom cultivation as perceived by the trainees have been depicted in Table 3.

A critical look at the Table 3 revealed that out

Table 1. Distribution of respondents on relevance of course contents (N=92)

Sr. No.	Particulars	Highly relevant		Quite relevant		Relevant		Somewhat relevant		Not relevant	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
A) Relevance of topics presented											
1.	Spawn growth	18	19.57	40	43.48	21	22.83	8	8.70	5	5.43
2.	Fruiting bodies	27	29.35	27	38.04	20	21.74	10	10.87	8	8.70
3.	Input requirement	22	23.91	33	35.87	8	8.70	16	17.39	13	14.13
4.	Climate requirement	33	35.87	38	41.30	13	14.13	4	4.35	4	4.35
5.	Sterilization of straw	28	30.43	40	43.48	22	23.91	2	2.17	—	—
6.	Bed setting and spacing	27	29.35	41	44.57	24	26.09	—	—	—	—
7.	Cropping and harvest	25	27.17	40	43.48	15	16.30	6	6.52	6	6.52
8.	Yield of mushroom	11	11.96	41	44.57	32	34.78	5	5.43	3	3.26
9.	Storage of mushroom	24	26.09	30	32.61	23	25.00	6	6.52	9	9.78
10.	Marketing of produce	21	22.83	25	27.17	19	20.65	12	13.04	15	16.30
B) Relevance of practicals conducted											
11.	Cultivation of oyster mushroom	70	76.09	18	19.57	04	4.35	—	—	—	—
12.	Insects/pest and their control	20	21.74	54	58.70	16	17.39	—	—	2	2.17
13.	Teaching material shared	66	70.65	19	20.65	08	8.70	—	—	—	—
	Total	391		446		225		69		66	
		(32.69)		(37.29)		(18.81)		(5.77)		(5.43)	

Figures in parenthesis indicates percentage

Table 2. Distribution of respondents on the extent of usefulness of topics as perceived by trainees (N=92)

S.	Levels of usefulness	Score range	Frequency	Percentage
1.	Least useful	Upto 20	24	26.08
2.	Useful	21 to 28	54	58.70
3.	Most useful	29 and above	14	15.22

of 12 topics covered in the training programme including topics of practicals, it was interesting to note that only two topics namely bed setting and spacing and cultivation of oyster mushroom as most useful by over half of the respondents (52.17 and 56.52% respectively). However most of the topics were perceived only useful by majority of the respondents. Among these period of spawn growth (73.91%), duration of fruiting bodies (64.13%), requisite climate requirement for mushroom growth (95.65), cropping and harvest of mushroom (80.43%), yield of mushroom (68.48%) and insect, pest and diseases and their control (70.65%). The topics which were perceived least useful were input requirement for mushroom growth (58.70) marketing of produce (67.39) and storage of mushroom (61.96%).

It could therefore be inferred that quite a few topics of mushroom cultivation were perceived as most useful by the trainee whereas most of the topics were perceived useful by the trainee.

Ranking of topics on the basis of mean score for relevance of course content and utility

Twelve topics were included in the training programme of mushroom cultivation and its relevance and utility were ascertained from the respondents. The mean score for each topics was computed and ranks were assigned on the basis of mean score for both the aspects of training and the data thus obtained have been furnished in Table 4.

It is evident from the mean scores and ranks in Table 4 that the topics namely cultivation of oyster mushroom, bed setting and spacing, sterilization of straw occupied higher position with respect to both, that is relevance of course content covered and utility of topics from the respondents point of view. The topics which were rated higher in respect of relevance of course content and utility might be important one in taking a

decision for adoption of mushroom cultivation. These topics were followed by the topics in ascending magnitude were insects/pest and disease, climate requirement for mushroom growth. These topics might be equally important from the point of view of mushroom cultivation by the trainee and hence they were preferred. The rest of the topic received relatively lower priority because of the fact that once they go for cultivation of mushroom, the other aspects can be taken care of in due course of time as most of the topics related to the infrastructural aspects. The findings thus indicated that due care was exercised in formulating the content of training programme on mushroom cultivation with a view to provide complete knowledge about cultivation of mushroom.

Fulfillment of expectations : Expectation refers to the aspect that trainees desire to acquire information during training as per their job requirements. Responses were recorded on five point continuum and scored as i) extremely met-5, ii) fairly met-4, iii) satisfactorily met-3, iv) met to some extent-2, (v) not met-1.

The data incorporated in Table 5 reveal that nearly half of the respondents (46.74%) perceived that their expectations in attending the training are satisfactory met. Almost equal number of respondents felt their expectations are extremely met (20.65%) and met to some extent (17.39%). It is again interested to note that 10.87 per cent respondents perceived their expectations are not met in joining the training.

Confidence level : Respondents were asked to state whether they gained confidence to start mushroom cultivation after this training programme. One score was given to 'Yes' response and zero for 'No' response.

It is evident from Table 6 that more than half of the respondents (55.43%) felt that their confidence level was increased to start mushroom cultivation after this training. Respondents in 'No' category were 44.57 per cent indicates that the training institute missing some aspects to increase the confidence level of respondents or might be the wrong selection of trainees.

Training effectiveness : By taking into account, the above indicators of training effectiveness, total score in this aspect was worked out by adding scores of all aspects considered responsible for organizational effectiveness and then the training effectiveness was worked out.

Table 3. Distribution of respondents according to the utility of topics covered in the training programme as perceived by them (N=92)

Sr. No.	Particulars of usefulness of course content of training	Most useful		Useful		Least useful	
		Freq.	%	Freq.	%	Freq.	%
1.	Period of spawn growth	10	10.87	68	73.91	14	15.22
2.	Duration of fruiting bodies	13	14.13	59	64.13	20	21.74
3.	Input requirement	—	—	38	41.30	54	58.70
4.	Climate requirement	—	—	88	95.65	04	4.35
5.	Sterilization of straw	11	11.96	80	86.96	01	1.09
6.	Bed setting and spacing	48	52.17	32	35.87	12	6.52
7.	Cropping and harvest of mushroom	05	27.17	74	80.43	13	14.13
8.	Yield of mushroom	03	3.26	63	68.48	26	28.26
9.	Storage of mushroom	14	15.22	21	22.83	57	61.96
10.	Marketing of produce	02	2.17	28	30.43	62	67.39
11.	Cultivation of Oyster mushroom	52	56.52	32	31.52	08	8.70
12.	Insect pests and diseases and their control	10	10.87	65	70.65	17	18.48
Total		168		648		288	

Table 4. Mean score and ranking for relevance and utility (N= 92)

Sr. No.	Particulars	Relevance course content covered		Utility of topics	
		Mean score	Rank	Mean score	Rank
1.	Period of spawn growth	3.63	VIII	1.85	VIII
2.	Duration of fruiting bodies	3.55	IX	1.86	VII
3.	Input requirement	3.38	XI	1.41	XI
4.	Climate requirement	4.00	VI	1.96	IV
5.	Sterilization of straw	4.02	III	2.11	III
6.	Bed setting and spacing	4.03	III	2.39	II
7.	Cropping and harvest of mushroom	3.78	VI	1.91	VI
8.	Yield of mushroom	3.57	VII	1.75	IX
9.	Storage of mushroom	3.50	X	1.53	X
10.	Marketing of produce	3.29	XII	1.35	XII
11.	Cultivation of oyster mushroom	4.72	I	2.48	I
12.	Insect/pests and diseases and their control	4.01	V	1.92	V

Table 5. Distribution of respondents on the extent of fulfilment of expectations (N = 92)

S. No.	Extent of fulfilment of expectations	Respondents	
		Frequency	Percentage
1.	Extremely met	19	20.65
2.	Fairly met	04	4.35
3.	Satisfactorily met	43	46.74
4.	Met to some extent	16	17.39
5.	No met	10	10.87

Table 6. Distribution of respondents on their response to start mushroom cultivation (N=92)

S. No.	Response option	Respondents	
		Frequency	Percentage
1.	Yes	51	55.43
2.	No	41	44.57

Table 7. Distribution of respondents according to their level of training effectiveness (N=92)

S. No.	Training effectiveness level	Index	Respondents	
			Frequency	Percentage
1.	Less effective	Upto 67.98	21	22.83
2.	Effective	67.99 to 93.28	60	65.21
3.	Highly effective	Above 93.28	11	11.96

$X = 80.63$; $SD = 12.65$

The data depicted in Table 7 show that 65.22 per cent respondents perceived that training programme was effective however 22.83 per cent respondents perceived training was less effective, only 11.96 per cent respondents felt training programme on mushroom cultivation was highly effective.

It is inferred that majority of trainees perceived the training programme on mushroom cultivation, effective. The reason for not perceiving the training programme highly effective may therefore needs to search

out. It may be because of certain constraints felt on the part of trainee or trainer. However, it should be noted that the overall training effectiveness is considered in this study only on the perception of trainees alone.

In the process of training other partners, sponsoring agency trainers and authorities of implementing institute also matter much.

CONCLUSION

The study has clearly indicated that about 77 per cent of the respondents perceived the mushroom training programme either as effective as highly effective. Further about 55 per cent of the trainees were confident enough to start mushroom cultivation after the training. However, there is a slope to improve the quality of the programme.

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Impact of Brackish Water Fish Farmers Development Agency in Promoting Crab Culture

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ABSTRACT

The demand for crab farming has risen worldwide because of its high profitability and very good export demand. The study was conducted among randomly selected 60 crab farmers of Gosaba block of South 24 Parganas district of West Bengal to investigate the impact of BFDA on crab farmers. The results indicated that a majority of respondents (55%) belonged to Scheduled Caste and half (50%) of the respondents were educated up to primary level. With regard to awareness about BFDA, 98.34 per cent of respondents were aware about BFDA, and 83.33 per cent of the respondents expressed dissatisfaction about supply of credit for crab farming. The results further revealed that 45 per cent of respondents expressed their satisfaction, 35 per cent crab farmers expressed dissatisfaction and 16.66 per cent were very much dissatisfied about technical advice provided by BFDA. The net income earned by crab farmers was Rs. 1500/- in 720 sq feet water bodies.

The ever-increasing human population is a great challenge for all food producers to satisfy the nutritional requirements of many more people in 21st century. Crab has been an important source of animal protein and other nutrients, which are required for human health. The demand for crab has risen worldwide as populations have grown, incomes increased and the nutritional benefits of crab become better known. There is a close association between man and crab since time immemorial. According to Chalodacan and Platonist philosophy, cancer is the gate of man through which soul passed from heaven to earth and into human bodies. Ancient people believed in the group of stars in the sky, which forms the figure of crab- "Cancer" the fourth zodiac sign. So the relation with man is too old.

Mud crab farming offers reliable incomes to both small and large farming operations and contributes significantly to the protein intake of the resource poor households (Rajasekaran and White ford, 2001 and Allan, 2003). Future increases in demand for crab cannot be met

by increasing catches (capture fisheries) from most natural fisheries resources system, so there is a need of crab farming in Sunderbans (culture fisheries). The Brackish Water Fish Farmers Development Agency (BFDA) provides technical advice to farmers for culture of mud-crab (*Scylla seratta*) for income and employment generation in crab farmers of Sunderbans of West Bengal. Keeping these facts in mind, the study was conducted to evaluate the role of BFDA in mud-crab farming in Sunderbans of West Bengal.

Salient features of BFDA

Brackish Water Fish Farmers Development Agency (BFDA) was first established during 1983-84. The objective of BFDA is to utilize fallow marshy wasteland, which is not suitable for agriculture in coastal districts, and to develop brackish water fisheries on scientific manner to produce fish prawn protein to provide employment, earn foreign exchange and for all round development to raise socio-economic condition of the poorest of the poor.

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The BFDA provides technical advice to the farmers for adoption of shrimp, crabs and other brackish water species on scientific lines. The present investigation was conducted to evaluate the role of BFDA in promoting crab cultures in Sunderbans of West Bengal.

METHODOLOGY

Crabs are generally cultured in three districts of West Bengal namely North 24 Parganas, South 24-Parganas Purba Medinipur as these three districts have brackish water resources. Brackish water is essential for culture of mud brad (*S. serrata*). Among the three districts, South 24 Parganas has the highest concentration of crab farmers. There are 29 blocks in South 24 Parganas district. Out of 29 blocks, Gosaba block was selected purposively as the maximum numbers of crab farmers living in this block.

There are 14 Gram Panchayats in the Gosaba block. Out of 14 Gram Panchayats, Lahiripur Gram Panchayat was selected positively as this Gram Panchayat has the highest concentration of crab farmers. There are 11 villages in the Lahiripur Gram Panchayat. From Lahiripur Gram Panchayat, three villages namely-Lahiripur, Chargheri and Parasmoni were selected by simple random sampling without replacement technique. Thus the total numbers of villages for the present study were three.

A list of crab farmers was prepared for each village. There are 50 crab farmers in Lahiripur village; 40 crab farmers in Parasmoni village and 30 crab farmers in Chargheri village. From each village, 50 per cent crab farmers were selected by simple random sampling without replacement technique. Thus a total of 60 crab farmers were selected which formed the sample of the study.

The data were collected through, a well-structured interview schedule.

RESULTS AND DISCUSSION

Socio-economic profile of the respondents : The data presented in Table 1 indicate that 41.67 per cent of the respondents belonged to middle age group, whereas 50 per cent of respondents had educated up to primary level. With regard to gender, 76.66 per cent were male and 23.34 per cent were female. In case of caste, 55 per cent of the respondents belonged to Scheduled Caste. It can be inferred that mostly primary educated and scheduled caste populations were engaged in crab farming.

Level of awareness: The study revealed (Table 2) that the majority of crab farmers were aware about BFDA and only 1.66 per cent of crab farmers were not aware about BFDA. It can be inferred that due to outbreak of white spot diseases in prawn and bans in the use of antibiotics, farmers are now interested in crab farming.

Credit facility: The findings of the study indicated (Table 3) that 83.33 per cent of respondents expressed dissatisfaction about supply of credit for crab farming. It can be stated that farmers were dissatisfied about the supply and they experienced a great difficulty to get a loan from bank.

Number of visits to a bank to get a loan: The findings were further asked to indicate the number of visits to a bank to get a loan from bank. The responses are presented in Table 4. The study showed that 66.67 per cent of respondents went more than four times to a bank to get a loan whereas 33.33 per cent of crab farmers indicated that they went three times to a bank to get a loan.

Reaction of farmers about technical advice: The findings of the study (Table 5) indicated that 45 per cent of respondents expressed their satisfaction about technical advice provided by BFDA, whereas 35 per cent of crab farmers were dissatisfied about technical advice provided by BFDA. It can be mentioned here that there is no hatchery for production of crab seeds in West Bengal. So BFDA could not supply advice about crab seeds to crab farmers.

Change of occupation : The findings of the study (Table 6) indicated that 58.33 per cent respondents did not change their occupation, whereas 41.67 per cent respondents mentioned that they changed their occupation. It can be said that who were earlier engaged in prawn farming shifted their occupation from prawn farming to crab farming in addition to their agricultural work.

Impact income

The result of the study indicated that the net income earned by the crab farmers was Rs.1500 per cattha (100 Sq. feet). But it can be mentioned here that the amount of net income depended upon demands in overseas market.

Impact on employment generation

It can be mentioned here that crab farming is a seasonal occupation and farmers in the study area get 15-20 days (SD =5) employment in a year in crab farming. It is a mono cropped area. The farmers usually get the benefit at the time of sowing and harvesting of paddy. De-

Table 1. Distribution of respondents according to their socio-economic profile (N=60)

S. No	Attributes	Frequency	Percentage
1. Age			
a)	Young (upto 25 years)	20	33.33
b)	Middle (26-50 years)	25	41.67
c)	Old (above 50 years)	15	25.00
2. Education			
a)	Illiterate	1	1.67
b)	Can read & write only	7	11.67
c)	Primary	30	50.00
d)	Madhyamik	19	31.67
e)	Higher Secondary	2	3.33
f)	Graduate & above	1	1.67
3. Gender			
a)	Male	46	76.66
b)	Female	14	23.34
4. Caste			
a)	General	13	21.67
b)	Scheduled Caste	33	55.00
c)	Scheduled Tribe	14	23.33
5. Occupation			
a)	Fishery	32	53.33
b)	Agricultural labourer	20	33.34
c)	Agriculture	08	13.33

Table 2. Level of awareness about BFDA (N = 60)

S. No.	Awareness Level	Frequency	Percentage
1	Aware	59	98.34
2	Not aware	1	1.66

Table 3. Satisfaction with credit, facilities (N=60)

S. No.	Level of satisfaction	Frequency	Percentage
1.	Highly satisfied	1	1.68
2.	Satisfied	2	3.33
3.	Undecided	2	3.33
4.	Dissatisfied	50	83.33
5.	Very much dissatisfied	5	8.33

Table 4. Number of visits paid to get a loan (N = 60)

S. No.	Number of visits	Frequency	Percentage
1	1 time	-	
2	2 times	-	
3	3 times	20	33.33
4	4 times	40	66.67

Table 5. Satisfaction about the technical advice provided by BFDA (N = 60)

S. No.	Response	Frequency	Percentage
1	Very much satisfied	1	1.66
2	Satisfied	27	45
3	Undecided	1	1.68
4	Dissatisfied	21	35.00
5	Very much dissatisfied	10	16.66

Table 6. Change of occupation of crab-farmers (N=60)

S. No.	Response	Frequency	Percentage
1	Not shifted their occupation	25	41.67
2	Shifted their occupation from prawn farming to crab farming	35	58.33

the interval between the sowing and harvesting, there is a fall in employment. Crab farming generally occurred from the month of September to November. So it reduces the seasonal unemployment in the study area.

CONCLUSION

Brackishwater Fish Farmers Development Agency has played a positive role to improve production, generate employment and to raise level of income of crab farmers in Sunderbans. The study revealed that the crab farmers experienced a great difficulty to get a loan from a bank. So, necessary steps should be taken so that the farmers may get loan timely and easily. The findings of the study revealed that only 45 per cent of respondents expressed satisfaction about technical advice provided by BFDA so there is an urgent need to provide technical advice timely to improve farmers level of knowledge about crab farming. There are various middlemen who are involved in crab marketing. So, there is an urgent need to strengthen co-operative system to prevent exploitation of middlemen and to trap overseas market.

The study also indicated that there is no crab hatchery in West Bengal, so farmers have to depend upon capture of crab seedlings. Now due to over catching of

crab seedlings there is depletion of natural stock. So, there is an urgent need to establish crab hatchery in West Bengal to prevent over catching of crab seedlings. Therefore, concerted extension education efforts are needed to educate crab farmers for adoption of crab farming on scientific line to improve productivity and raise level of income.

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Impact Assessment of Agricultural Technology Information Centre of IARI

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ABSTRACT

An evaluation study of Agricultural Technology Information Centre (ATIC) of Indian Agricultural Research Institute (I.A.R.I.) was undertaken with the objective of investigating the impact of ATIC on farmers. Data were collected from sixty nine farmers who had visited ATIC. The study revealed that the ATIC of IARI had a positive impact on farmers, knowledge on agriculture, marketing and entrepreneurial development, confidence in using new agricultural technologies, increase in income and savings, decrease in debts and adoption of ATIC products, services and information. However, inadequate supply of products, non-availability of staff at all the time, and seasonal availability of planting materials were the constraints faced by the farmers.

There is a greater need for coordination and intensive interaction between the researchers and technology users. A better integration could be achieved by establishing a formal management mechanism between the scientists or department in-charges of various relevant disciplines engaged in interdependent tasks on one hand and technology uses on the other. This linkage mechanism should have mandated facilities and designated functions. The establishment of Agricultural Technology Information Centre (ATIC) is intended to provide such mechanism, beyond individual units of research information. This serves as a single window system with an objective to help the farmers and other stakeholders to provide solution to their location specific problem and make available all the technology information along with inputs and products use. It is felt that the facility of a 'single window' approach at the entrance of the ICAR Institutes/ State Agricultural Universities will enable them to have the access to the required information for the solutions to their problems.

The Indian Agricultural Research Institute (IARI) is one of the premier farm research centers of India which is responsible for ushering green revolution in India. The ATIC at IARI was established during the year 1998. The present study aims at investigating the impact of ATIC on Farmers.

METHODOLOGY

The data were collected from sixty nine farmers who had visited ATIC and the staff of ATIC. Random sampling technique was used to draw representative sample of respondents. The list was prepared from the registers/record of ATIC visiting farmers. An interview schedule was devised and data were collected in respect of satisfaction in terms of functional effectiveness of ATIC which included components such as product services and information, impact, constraints faced by the farmers and the staff. Focus group discussions were held with farmers who had visited ATIC and the staff of ATIC including the manager.

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RESULTS AND DISCUSSION

Profile of the respondents

It was observed that 88.4 per cent of the respondents were male as compared to 11.6 who were females. Majority of these were young (31% in the range of 22 to 29 years and 45% in the range of 30-39 years). About 35 per cent of them were educated up to high school level and 19 percent had completed high school. Around 29 per cent of them had studied up to graduation level. Seventy eight per cent were farmers and 11 per cent were dairy farmers. Furthermore while 43.5 per cent of the respondents had 4-6 acres of land, 26.1 percent had 1-3 acres; forty seven per cent had 1-5 cows/buffaloes, 26 per cent had 1-6 cows/buffaloes. Thirty per cent of the farmers had an annual income of 25,001 to Rs. 50,000 and 17 per cent had Rs. 50,000 to 100000.

Nature and Frequency of Visit

It was observed that 43.5 per cent of the respondents had been visiting ATIC since the last 2-3 years and 20 per cent since the last one year. Regarding the frequency of visit it was seen that 24.6 per cent of the respondents visited ATIC 3-4 times year, 18 per cent twice a year and 21.7 per cent once a year, twenty per cent visited even more than 10 times a year.

Initial source of information regarding ATIC

It is important to know from where the farmers got information about the ATIC. The study showed (Table 1) that 36.2 per cent of the respondents had learnt about ATIC from friends and 20.3 per cent from other farmers. Television was the initial source of information for 18.8 per cent, radio for 14.5 per cent and the press for 10.1 per cent.

Rating of ATIC facilities

To probe the effectiveness of ATIC the facilities were rated by the farmers. The rating of ATIC facilities were rated in terms of its approach, public parking, infrastructure and meeting rooms on a 1 to 5 scale ranging from poor to excellent. The study showed that twenty eight per cent of the respondents rated the approach of ATIC as excellent. Similarly other ATIC facilities like public parking, infrastructure and meeting rooms were combined excellent by 21.7 %, 20.9 % and 23.2 % of respondents respectively. There was a very low percentage who rated these facilities below average.

Functional effectiveness of ATIC

The impact of ATIC was further judged through the functional effectiveness which was measured in

Table 1. Distribution of respondents by initial source of information regarding ATIC (N=69)

S.N	Sources of information	Frequency	Percentage
1	TV	13	18.8
2	Press	7	10.1
3	Friend	25	36.2
4	Radio	10	14.5
5	Other farmers	14	20.3

Table 2: Rating of ATIC facilities (N=69)

S. N.	ATIC facilities	Percentage of respondents					mean	Sd
		Poor %	Fair %	Av. %	Good %	Excel lent %		
1.	Approach of ATIC	4.4	14.7	20.6	30.9	27.9	4.04	3.51
2.	Public parking at ATIC	14	14.5	33.3	29.0	21.7	3.55	1.03
3.	Infrastructure of ATIC	1.5	13.4	34.3	29.9	20.9	3.55	1.03
4.	Meeting rooms	7.2	11.6	21.7	36.2	23.2	3.55	1.18

terms of five important indicators such as availability, appropriateness, adequacy, timeliness and cost for ATIC products, services and information. This was computed on a scale of 1-5 in terms of the degree of satisfaction. The data are presented in Table 3. It is evident from the Table that in terms of availability of products 6.3 per cent of the respondents were very satisfied, and 20.6 per cent were satisfied 39.7 per cent were dissatisfied. For availability of services while 7.1 per cent were highly satisfied and 14.3 per cent satisfied about 30 per cent were undecided and 32.1 per cent were dissatisfied. In the case of availability of information 10.5 per cent were highly satisfied and 7.0 per cent were satisfied. A similar trend was seen in the case of appropriateness, adequacy, timeless and cost.

The overall functional effectiveness was also gauged and the responses were tabulated in Table 4. The overall functional effectiveness picture of ATIC showed that the majority of the respondents were dissatisfied with the ATIC products, services and information.

Table 3: Functional effectiveness of ATIC (N=69)

S.N.	ATIC	Degree of Satisfaction					Mean	Sd
		Highly satisfied %	Satisfied %	Undecided %	Dissatisfied %	Highly dissatisfied %		
A	Availability							
	Product	63	20.6	14.3	39.7	19.0	3.34	1.202
	Service	7.1	14.3	30.4	32.1	16.1	3.36	1.135
	Information	10.5	7	8.8	52.6	21.1	3.67	1.20
B	Appropriateness							
	Product	3.3	26.7	21.7	28.3	20.0	3.35	1.176
	Service	1.9	18.9	30.2	35.8	13.2	3.40	1.007
	Information	3.6	8.9	19.6	51.8	16.1	3.68	0.974
C	Adequacy							
	Product	3.3	18.3	26.7	38.3	13.3	3.40	1.045
	Service	3.9	19.6	27.5	39.2	9.8	3.31	1.029
	Information	1.8	10.9	10.0	54.5	21.8	3.84	0.978
D	Timeliness							
	Product	8.1	16.1	16.1	43.5	16.1	3.44	1.182
	Service	4.3	12.8	19.1	48.9	14.9	3.57	1.037
	Information	1.9	7.5	13.0	58.5	18.9	3.85	0.886
E	Cost							
	Product	6.7	16.7	8.3	50.0	18.3	3.57	1.170
	Service	8.7	17.4	13.0	43.5	17.4	3.43	1.223
	Information	2.0	3.9	11.8	60.8	21.6	3.96	0.824

Hence even though the respondents found ATIC products, services and information important and relevant a majority of them were not satisfied with the availability, appropriateness, timeliness, cost and adequacy. There is a great demand of IARI products (especially seeds) and information and there is great expectation but IARI being a research oriented Institute is able to supply, its basic products/services on a limited basis only.

Satisfaction with behaviour and responsiveness of ATIC staff

Behaviour and responsiveness of the staff are and important indicators to reveal effectiveness. The respondents were also asked to indicate their degree of satisfaction regarding these parameters.

The data in Table 5 give the degree of satisfaction with the behaviour and respondents of ATIC staff. Here we observe that majority of the respondents are 'highly satisfied' and 'satisfied' with the staff members.

Satisfaction with single window approach

ATIC is intended to serve as a 'Single Window System' for the farmers. Hence it is imperative to find

the satisfaction from farmers perspective regarding this approach. Table 6 presents the data on the degree of satisfaction of the respondents with the Single Window Approach. Here we observe that majority of the respondents are dissatisfied with the single window approach. This may be because the services are not centralized and the farmers have to be taken to different departments. ATIC does not have its own vehicle. If a van is provided a mobile service can be started.

Impact of ATIC on farmers

Other important parameters considered to find the impact of ATIC on respondents are the improvements in knowledge of agriculture, marketing, entrepreneurship development, income, savings and adoption besides decrease in debts. This data is presented in Table 7.

The impact of ATIC on farmers was assessed in terms of the degree of improvement on a 1-5 scale (hardly any improvement to great improvement), in the areas of knowledge on agriculture, confidence in using new agricultural technologies, knowledge of marketing, entrepreneurial development, increase in income, decrease

Table 4: Overall functional effectiveness of ATIC (N=69)

S.N.	Product/ Service/ Information	Degree of Satisfaction					Mean	Sd
		Highly satisfied %	Satisfied %	Undecided %	Dissatisfied %	Highly dissatisfied %		
1.	Product	10.7	5.4	8.9	41.6	30.4	3.79	1.246
2.	Service	9.1	12.1	15.2	45.5	18.2	3.52	1.202
3.	Information	8.6	5.7	11.4	45.7	28.6	3.80	1.183

Table 5: Satisfaction with behaviour and responsiveness of ATIC staff (N=69)

S.N.	Product/ Service/ Information	Degree of Satisfaction					Mean	Sd
		Highly satisfied %	Satisfied %	Undecided %	Dissatisfied %	Highly dissatisfied %		
1.	Behaviour	7.0	7.0	8.8	36.8	40.4	3.96	1.195
2.	Responsiveness	5.3	7.0	5.3	40.4	42.1	4.07	1.116

Table 6. Satisfaction with single window approach (N=69)

S. No.	Degree of satisfaction	Products		Service		Information	
		F	%	F	%	F	%
1	Highly Satisfied	7	13.0	5	12.8	3	7.3
2	Satisfied	3	5.6	6	15.4	2	4.9
3	Undecided	8	14.8	2	5.1	6	14.6
4	Dissatisfied	15	27.8	17	43.6	17	41.5
5	Highly Dissatisfied	20	37.0	9	23.1	13	31.7
	Total	54	100.0	39	100.0	41	100.0
	Mean	3.76		3.49		3.85	
	S.D	1.400		1.335		1.152	

in debts, increase in savings, adoption of ATIC products, services and information.

It is evident from the Table 7 that ATIC is having a positive impact on the farmers in terms of the above indicators. Thirty six per cent of the respondents have reported 'quite some improvement' and 31.10 per cent 'medium improvement in knowledge on agriculture'. Thirty seven per cent have also reported 'quite some improvement' and 30.6 per cent 'medium improvement' in 'confidence in using new agricultural technologies.

Regarding 'knowledge of marketing' it was seen that 24.20 per cent of the respondents reported 'quite some improvement' and 43.5 per cent 'medium improvement'. In the case of 'entrepreneurship development' these figures were 21.0 per cent and 59.7 per cent. As far as 'increase in income and decrease in debt' was concerned these figures were 27.4 per cent, 38.7 per cent and 21.3 per cent, 39.30 per cent respectively. Furthermore in the case of 'increase in savings' 25.8 per cent of the farmers reported 'quite some improvement' and 43.5 per cent 'medium improvement'. A similar trend was reported for 'adoption of ATIC products', 'services' and 'information'. Hence it may be concluded that the ATIC project of IARI had a positive impact on farmers.

Constraints experienced by the farmers for ATIC

In order to understand the constraints faced by farmers, respondents were asked to list the constraints and rank order the first three. The overall rating and rank order is given in table 8.

The study showed that inadequate supply of product is the most severe constraint followed by 'non-availability of staff all the time', and 'seasonal availability of planting material'. Next in order are 'products are costly', 'non-availability of planting material at centre itself' and 'delay in soil/water testing services'. These constraints are followed by 'waiting for concerned scientists', 'need for multiple visits to go

Table 7: Impact of ATIC on respondents (N=69)

S. No.	Parameters	Degree of Improvements (%)					Mean	Sd
		Great	Quite some	Medium	Little	Hardly		
1.	Knowledge of agriculture and Confidence in using new agril technology	4.9	36.1	31.1	14.8	31.1	2.95	1.117
2.	Knowledge of marketing	6.5	37.1	30.6	9.7	16.1	2.92	1.178
3.	Entrepreneurial development	9.7	24.2	43.5	14.5	8.1	2.87	1.048
4.	Increase in income	4.8	21.0	59.7	6.5	8.1	2.92	0.893
5.	Decrease in indebtedness	8.1	27.4	38.7	19.4	6.5	2.89	1.026
6.	Increase in saving	11.5	21.3	39.3	13.1	14.8	2.95	1.190
7.	Adoption of ATIC products	4.8	25.8	43.5	12.9	12.9	3.03	1.055
8.	Adoption of ATIC service	8.1	38.7	30.6	16.1	6.5	0.74	1.039
9.	Adoption of ATIC information	6.6	45.9	24.6	16.4	6.6	2.70	1.038

Table 8 Constraints faced by farmers for ATIC (N=69)

S.N.	Constraints	Rank
1.	Inadequate supply of products	I
2.	Non - availability of staff all the time	II
3.	Seasonal availability of planting material	III
4.	Products are costly	IV
5.	Non availability of planting material at centre it self	V
6.	Delay in soil and water testing	VI
7.	Waiting for concerned scientists. Need for multiple visits to get solutions for plant disease/ test	VII
8.	Difficulty in following as per the recommendations	VIII
9.	Inconvenience in visiting ATIC	IX
10.	Generalized recommendations, no firm answer	X
11.	Behaviour of staff	XI

solution for plant disease/ pest', 'difficulty in following as per the recommendations'. However down the ladder are 'Inconvenience in visiting ATIC' and 'generalized

recommendations', 'no firm answer' and 'behavior of staff'. 'Inadequate supplies' are again due to the research mandate of the Institute.

CONCLUSION

Mostly young people (22-40 years) are visiting ATIC and this is a potential group, which can impact agriculture. Hence special programs/seminars/training may be organized for them. Only eleven per cent of the respondents were women hence, more women farmers need to be motivated to visit ATIC, keeping in view their high rate of participation in agriculture and animal husbandry. Majority of the farmers visiting ATIC are educated so more of printed media can be used.

The study revealed that the ATIC project of IARI had a positive impact on farmers in terms of improvement in the areas of 'knowledge on agriculture', 'marketing' and 'entrepreneurial development', 'confidence in using new agricultural technologies', 'increase in income and savings', 'decrease in debts' and 'adoption of ATIC products, services and information'. However, 'Inadequate supply of product', 'non-availability of staff at all the time', and 'seasonal availability of planting material' were the most severe constraints faced by the farmers for ATIC.

Impact of KVK's Maize Production Training Programme on Farmers Knowledge and Adoption Level

R. Joseph¹ and R.N. Padaria

ABSTRACT

The investigation is an attempt to study the impact of Krishi Vigyan Kendra's (KVKs) maize production training programme on farmers knowledge and adoption. The study was conducted at the Shabad mandal of Rangareddy district of Andhra Pradesh. The investigation showed that due to maize training programme the knowledge level of farmers had increased for practices like weeding, fertilizer application, plant protection measures and harvesting. Increased adoption was observed for practices like conducting germination test, soil testing, seed treatment, basal application of fertilizers, and top dressing. The impact of the training programme was also evident by significant increase in yields.

The need for improved transfer of technology has long been felt with inception of community development programme in 1952 and emphasized more and more, subsequently in programmes like IAAP, ND, HYVP, IRDP, IVLP, NATP and NAIP etc. In all these efforts, there were series of intermediaries between the research institutions and the practicing farmers. This resulted in lot of missing links as far as the transfer of the technology is concerned. In turn this has lead to build up of innovations in the organizations where they were generated. Many research findings have shown that only a part of the innovations generated has reached the actual users. It is therefore appropriate that the ICAR has launched Krishi Vigyan Kendras (KVKs) as its major extension activity to bridge the gap by bringing the scientists close to the farmers.

To find out the success of any programme a periodic appraisal and evaluation of what is being done is essential, so that suitable changes can be made to make the programme more effective. This creates a need to do some serious evaluation of the maize training programme organized by KVK attached to Central Research Institute for Dryland Agriculture, Hyderabad. Keeping this idea in

view, the present study was conducted with the objective of finding out impact of KVK training programme on maize production technology in enhancing the knowledge and adoption of maize farmers.

METHODOLOGY

Locale of the study : This study dealt with the impact of training programme on maize farmers. Hence, Shabad mandal of Rangareddy district of Andhra Pradesh when the programme was operated was purposively selected as the locale of the study. As the investigator was involved in the implementation of this programme, it was easy to get the needed secondary data as well as the local officials' help for the survey. Of all blocks of Rangareddy district, Shabad mandal completed two years under maize training programme with maximum beneficiaries from small, marginal and scheduled caste farmers. Hence Shabad mandal was considered for this study. Of the 33 villages in Shabad mandal three villages were covered under the programme. These three villages namely, Muddamguda, Tallapally and Bobbiligaon had the maximum beneficiaries belonging to small, marginal, and scheduled caste farmers. So all the three villages were selected for the study.

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Selection of respondents : Out of 120 total farmers who participated in maize training programme 60 farmers viz., 20 each from the three selected villages were randomly selected as respondents.

Knowledge and adoption levels of the farmers : The following twelve practices were selected to find out the extent of knowledge and adoption: land preparation, seed treatment, time of sowing, conducting germination test for seeds, maintenance of spacing, weeding, dose, method and time of fertilizer application, water requirement at critical stages, maturity stage, method of storage and grading and marketing skills

Extent of adoption : Extent of adoption of improved practices was measured based on the data from the respondents before training and after training.

Impact of training : The impact of the training was assessed through increase in knowledge, adoption of technologies as well as the increase in yield level of maize.

Method of data collection : The investigator interviewed each of the selected respondents personally. The data was directly recorded on the schedule. Secondary data required for the study was obtained from records of village panchayat office, block office, KVK officials at Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad and from Zonal Co-ordinator, training programme, Zone-V, Hyderabad.

Table 1. Knowledge levels of farmers Before and After the training (N=60)

S. No.	Maize production	Percentage of farmers having knowledge before training	Percentage of farmers having knowledge after training
1.	Land preparation	59 (98.33)	60 (100.00)
2.	Seed treatment	0 (0.00)	60 (100.00)
3.	Sowing time	1 (1.67)	59 (98.33)
4.	Germination test	0 (0.00)	60 (100.00)
5.	Spacing	0 (0.00)	49 (81.67)
6.	Weeding	55 (91.67)	60 (100.00)
7.	Fertilizer application	25 (41.67)	35 (58.35)
8.	Plant protection	12 (20.00)	34 (56.66)
9.	Water requirement	10 (16.70)	40 (66.67)
10.	Harvesting	15 (25.00)	30 (50.00)
11.	Storage	20 (33.34)	40 (66.67)
12.	Marketing	10 (16.70)	30 (50.00)

RESULTS AND DISCUSSION

Influence of training programme on the extent of knowledge level before and after training

It is clear from the data in Table 1 that knowledge gain after training was significantly high among farmers for all the maize production technologies.

In case of land preparation the practice of ploughing across the slope was introduced along with summer tillage. The farmers learnt about the seed treatment and the value of germination test only after the training.

Before the training the farmers were following 10-12 cm spacing within plants and 30 cm between rows, which resulted in difficulty for intercultural and plant protection operations. This was overcome with training intervention, which recommended 15 cm within plants and 45 cm spacing between rows.

Before training, farmers were habituated to apply only basal dose of NPK fertilizers, that too less than the recommended levels. The training helped the farmers to get convinced of the benefits of additional N-application in the form of urea as top dressing with increased growth and yield potential.

The training exposed the farmers about IPM methods like establishment of bird perches, pheromone traps, NSKE application, etc. These methods proved cost effective and environmentally safe as the farmers before training practiced only chemical application of pesticides.

The training educated the farmers about the need to shift from paddy cultivation (high water requiring) to maize. Also irrigation to maize at critical stages increased yields significantly which was not practiced by the farmers before training.

The farmers were taught about healthy market practices, viz., grading, packing that fetched better prices to them. Also, awareness regarding sale of produce on the basis of market fluctuations was imparted to the farmers, which resulted in remunerative prices being received by them.

Extent of adoption of the maize production technologies: The data in Table 2 give an overall view of extent of adoption of ten selected practices of maize crop by farmers before and after training. None of the farmers followed the practice of "germination test and soil test" before attending the training, where as, after training all of them were adopting both the practices. Regarding

Table 2. Extent adoption of Maize production technologies (N=60)

S. No.	Production technologies	Percentage of farmers adopting	
		Before training	After training
1	Summer tillage	98	100
2	Conducting germination test	0	100
3	Seed treatment	2	98
4	Soil testing before sowing	0	100
5	Method of sowing	82	100
6	Weeding done after top dressing of urea	92	100
7	Fertilizer application/acre		
	i) Basal application		
	a) Quantity	30	70
	b) Method	87	100
	c) Time	87	100
	ii) Top dressing		
	a) Quantity	2	98
	b) Method	3	97
	c) Time	7	93
8	Market survey done before Maize sowing	3	97
9	Following IPM practices	82	100
10	Maintaining required irrigation at critical stages of Maize crop	82	100

seed treatment, 98 per cent of farmers were adopting it after training programme. With regard to the method of sowing, 82 per cent of them were adopting it before the training programme, the remaining 18 per cent adopted it after attending the training. Ninety two per cent of farmers were practicing weeding before training and the remaining eight percent were doing after training. Regarding basal application of fertilizers, the quantity, method and time were adhered by 30, 87 and 87 per cent of the farmers respectively before training programme. After training, 70, 100, 100 percent of them were adopting the quantity, method and time of basal application of fertilizers respectively. The top dressing of

Table 3. Impact of training in terms of Maize yields (q/ha)

S. No.	Indicators	Yield		Difference	't' value
		Before	After		
1	Yield	38.33	42.80	4.47	8.38 **

farmers before training for some components. After training, all the farmers were adopting the entire IPM package. Maintaining required irrigation at critical stages of maize was adopted by 82 and 100 per cent of farmers before and after training respectively.

Impact of training programme in terms of yield

The data in Table 3 show that the maize yield received by the farmers before the training was 38.33 quintals/ha which rose to 42.80 quintals/ha after the training. The increase in yield level was significant as seen from the value of 't'. Thus it is clear that the training programme had a positive impact in enhancing the maize yield.

CONCLUSION

The investigator attempted to study the impact of KVK maize production training programme on the farmers' knowledge and adoption level. The study was conducted at the mandal of Rangareddy district of Andhra Pradesh. The study revealed that the knowledge levels had increased for weeding, fertilizer application, plant protection measures and harvesting practices after the training programme. Increased adoption was observed for the practices like conducting germination test, soil testing, seed treatment, basal application of fertilizers, topdressing etc. The impact of the training programme was evident by significant rise in yields.

Improving Rice Productivity in Orissa : A Case of Rice Development Scheme

G.A.K. Kumar¹ and Manika Wason²

ABSTRACT

The study aimed at evaluating the Rice Development Scheme of the Directorate of Agriculture and Food Production, Government of Orissa. The investigation followed a case method approach with a focus on assessing the organisational and functional modalities of Rice Development Scheme. The study revealed that the Rice Development Scheme is a well planned programme. The targets of the programme were achieved in full. The study also showed that participation in Rice Development Scheme was significantly and positively correlated with level of knowledge and adoption of recommended rice cultivation practices. The study concluded that the Rice Development Scheme succeeded in imparting knowledge to the farmers resulting in adoption of improved rice cultivation practices.

According to 2001 Census, the population of Orissa is 36.7 million, out of which a whopping 31.2 million live in rural areas amounting to 85.03 per cent of total population of the state. Another interesting fact about Orissa is its total area under rice cultivation. The total cropped area in Orissa is 5656.53 thousand hectare, out of which 4096 thousand hectare i.e. 72.4 per cent area is under rice cultivation. Under this situation, rice assumes significant and central part of any development initiative. The State Government of Orissa through Directorate of Agriculture and Food Production initiated Rice Development Scheme under Work Plan for the state. The Rice Development Scheme was initiated with 27 components in the year 2001-02. The Scheme witnessed a number of changes over the years. Presently, the scheme addresses 18 components with many of the components modified, added and removed from the initial scheme list.

The present study aims to evaluate the Rice Development Scheme of the Directorate of Agriculture and Food Production, Government of Orissa with the specific objective of investigating the organizational and functional modalities of Rice Development Scheme.

About Rice Development Scheme

The primary responsibility of increasing agriculture production, enhancing productivity and exploring vast untapped potential rests on the state. The role of Government of India is to complement and supplement as a catalyst. In view of this GOI has moved from schematic approach to macro management mode to facilitate the state in achieving the desired level of agricultural growth. In Orissa, about 27 central plan and centrally sponsored plans are being implemented under macro management mode since 2001-02 with funding pattern of 90:10 between Centre and State. One of the schemes is Rice Development Scheme. At present, the Scheme consists of a number of components as mentioned below which is implemented through Directorate of Agriculture and Food Production of Orissa Government.

Farmers to farmers field schools on rice : The Farmers Field School (FFS) was started in the year 2003-04 under the scheme to impart knowledge and skills related to rice cultivation to the farmers. In the year 2005-06, it was renamed as Farmers to Farmers Field School (FFFS)

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when the expert – an Extension worker was replaced by progressive farmers. Now the farmer themselves were imparting knowledge and skill to fellow farmers in more convincing way. In each field school 50 farmers are trained five times during the entire cropping season, starting from land preparation to post harvest technology. The FFFS is conducted in the first week of every month. The training is of one day duration covering following aspects of crop production.

The budget for each FFFS is restricted to Rs.20,000. The participants are provided lunch costing Rs. 20 per head and a sitting allowance of Rs. 20 per day is also paid to the participants. Substitution of the participant is not allowed.

Exposure visit of farmers within the state : The Directorate of Agriculture and Food Production prepares a plan for the exposure visit of farmers within the state. Under the scheme 1400 farmers are sent to different agro-climatic zones. The farmers of age group 18 to 60 years, cultivating their own land are selected. The budget per farmer for the visit of four days is Rs.1000. Each farmer is charged Rs.10 as application fee for the exposure visit.

Exposure visit of farmers outside the state : The Joint Director of Agriculture (Information) prepares a plan for exposure visit outside the state. Ten groups (30 farmers and two guide officers per group) are sent to different states in the country. The farmers selected for the exposure visit are progressive farmers between the age group of 18 to 50 years. Seed producers under Seed Village Programme are given preference. A provision of Rs. 3000 per farmer is earmarked for exposure visit outside the state. Each farmer has to pay Rs.50 towards application fee.

Mixed cropping demonstration : Mixed Cropping Demonstration is conducted in 1250 acre of land. In the demonstration, Arhar+Paddy is taken up in 2-5 sequences in a compact patch of 10 acres. Preference is given to small and marginal farmers with emphasis on SC/ST and Women farmers. Under the scheme Rs. 2000 per acre is

District level pre-seasonal training for extension Workers : A District Level Orientation Training Programme for Extension Workers of 47 Agricultural districts are conducted during Kharif i.e. in the month of June. About 50 departmental officers are oriented in the one-day training programme having budget of Rs 5,000.

Block level awareness campaign : The block level awareness campaign is organized twice a year in Kharif and Rabi seasons. The programme is chalked out by DDA in consultation with DAOs/ADAOs. Various departments are invited to take part in the campaign. The thrust areas for the campaign are Productivity, Critical Input Management, Crop Diversification, Mixed Cropping, Farm Mechanisation and On-farm Water Management. The budgetary allocation for the campaign is Rs.20,000.

District level exhibition : The District Level Exhibition is conducted by DD/DAO having themes like Farm Mechanisation, Crop Diversification, Low Cost Technology, Post Harvest Technology, IPM, INM etc.Rs.50,000 is provided for organizing this exhibition.

Specialized training on seed production to seed growers under seed village programme : One training programme of two days duration is organized during the season. Fifty farmers are trained in the training on Seed Production. Total of 30 training programmes are organized in the state. The cost of the single training programme is Rs.5000.

Subsidy on distribution of certified paddy seeds : 65000 quintals of paddy seeds released within ten years are supplied during Kharif and Rabi season. A subsidy @25% of the cost limited to Rs. 200 per quintal is provided.

METHODOLOGY

The study was conducted in Cuttack district of Orissa where Rice Development Scheme has been initiated since its inception in 2001. The rice growing farmers were selected for the study. The study was

Schedule was developed to collect data from farmers, whereas guide was developed to conduct focus group with Extension functionaries.

RESULTS AND DISCUSSION

The results of the analysis have been presented according to the different components of the Rice Development Scheme. Overall, INR 1200.90 Lakhs was sanctioned for different Schemes under Work Plan 2005-06, whereas, INR 1195.45 Lakhs was the total expenditure. It can be observed that Farm Mechanization received 60 per cent of allocated fund because the cost of implements and machines are multifold higher than any of the other technologies. Rice development was given due weightage (31 per cent) according to its acreage.

Farmers to farmers field schools on rice : The farmers field school (FFS) on rice was initiated in the year 2003-04 which was later renamed as farmers to farmers field School (FFFS) due to innovative change in its approach. Previously, FFS was conducted by Extension Personnel who were replaced by Progressive farmers to achieve better communication and enhance acceptability of the rice technologies among the farmers. The allocation of number of FFFS and total funds over the years is depicted in figure No. 2. It can be observed that there has been substantial increase in the number of FFFS with matching allocation of fund for conducting FFFS on rice. Over three years (2003-04 to 2005-06), there had been 100 per cent target achievement against physical and financial allocation of FFFS on rice.

Exposure visit of farmers within the state : During last five years, 4,200 exposure visits of farmers within the state have been organized. With the exception of year 2001-02 when 2000 visits were organized, there has been steady number of exposure visits of farmers within state with matching allocation of fund. In case of exposure visit within the state, there had been 100 per cent target achievement for last five years against physical and financial allocation for the exposure visit of farmers within the state.

Exposure visit of farmers outside the state : During last five years, 1,380 exposure visits of farmers outside the state have been organized. Almost fifty per cent of the total exposure visits conducted during five years were organized during 2002-03. During last the two years, there has been a drastic reduction in exposure visits outside the state. However, during last five years there had been 100 per cent target achievement against physical and financial allocation for exposure visit of farmers outside the state.

Mixed cropping demonstration : Mixed Cropping demonstration in rice based cropping system was initiated in the year 2005-06 with the target of 1,250 demonstrations with the budget of INR 25 lakhs. The Directorate of Agriculture and Food Production of the state achieved the physical target within financial expenditure of INR 23.12 lakhs.

Block level awareness campaign : Like mixed cropping demonstration, block level awareness Campaign was also initiated in the year 2005-06 with the target of 314 Awareness Campaigns with the budget outlay of INR 62.80 lakhs. The Directorate was able to achieve both physical and financial targets.

State level pre-seasonal training for extension workers : Ever since State level pre-seasonal training for Extension Workers was initiated in the year 2002-03, it has been a regular feature. In fact the number of the training programme was doubled to impart training effectively and the budget for the programme was also doubled from 25 thousand to 50 thousand per programme.

District level pre-seasonal training for extension workers : District level pre-seasonal training programmes for Extension Workers on Rice have been a regular feature since its inception in year 2002-03. There are 30 districts in Orissa but the total number of training programmes conducted is one and half times more. In case of larger districts more than one training programme are conducted to make it more effective and meaningful.

District Level Exhibition : The year 2002-03 witnessed addition of yet another new component to rice Development Scheme. District level exhibitions on Rice were organized in 15 Districts. It covered all the districts of Orissa in the year 2005-06 before plunging to ten in year 2004-05. However, during all these years physical and financial targets were cent per cent achieved.

Specialized training on seed production to seed growers : The specialized training on seed production to Seed Growers under Seed Village Programme was started in the year 2003-04. There has been drastic change in the number of the training programmes. The target achievement with regards to physical and financial have been cent per cent in all three years.

Subsidy on distribution of certified paddy seeds : In case of subsidy on distribution of certified paddy Seeds physical target could be achieved only in the year 2003-04 whereas, financial targets were achieved during all the years. Since subsidy was based on market price, financial

targets were achieved before achieving the physical targets.

Incentive on distribution of green manure seeds: Similarly, in case of incentive on distribution of green Manure Seeds only financial targets were achieved during all the years. Since incentive was based on market price, financial targets were achieved before achieving the physical targets.

Incentive on production of certified paddy seeds: The incentive on production of certified paddy Seeds was started from the year 2002-03 and has been successfully achieving physical and financial targets over the years. Unlike subsidy, the incentive on production of certified paddy seeds were decided before hand, therefore there were no anomaly in targets and achievements.

Knowledge of rice cultivation practices : In order to ascertain the knowledge gained as result of the Rice Development Scheme, chi square test was employed (Table 1). The result shows that there was significant association between the participation in rice development scheme and the total knowledge of rice cultivation practices.

However, it should be noted that the correlation between the participation and level of knowledge of rice cultivation was positively significant($r=0.431^{**}$). That means those who participated in Rice Development Scheme had better knowledge of rice cultivation than those who did not participate.

Adoption of rice cultivation practices : It could be observed that the scenario of adoption of rice cultivation practices was not as discouraging as knowledge of rice cultivation practices. It came to the light while conducting focus group that the extension workers were asking (ordering) the farmers to adopt certain technology and farmers were blindly following it without asking any question. Like in case of seed treatment with salt, the packet of salt was being supplied with the seed and farmers were just asked to mix the content of the packet into the seed without giving the details. The data in table 2 show that there was significant association between participation in rice development scheme and total adoption of rice cultivation practices by the rice farmers.

The figure 12 shows the area, yield and production of Rice in the Orissa state. It can be observed that since 2001-02 there has been high production barring the year 2002-03, the drought period. Therefore, it can be concluded that the Rice Development Scheme is having positive and definite impact on rice cultivation in the state.

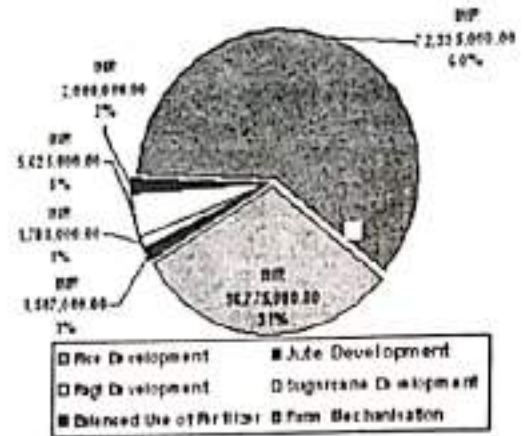


Fig. 1. Distribution of funds according to Schemes

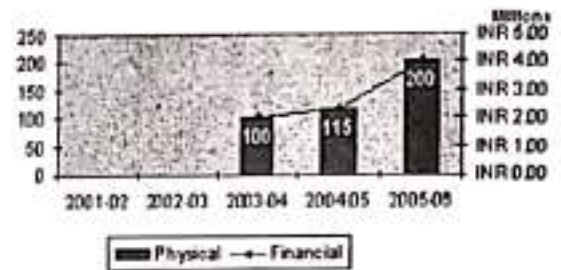


Fig. 2. Physical and financial allocation for farmers to farmer field schools on rice

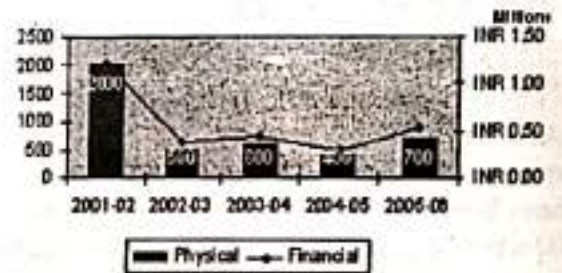


Fig. 3. Physical and financial allocation for exposure visit of farmers within state on rice

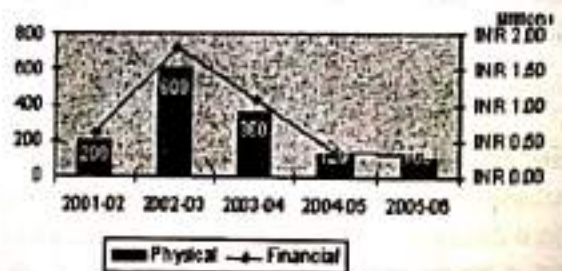


Fig. 4. Physical and financial allocation for exposure visit of farmers outside state on rice

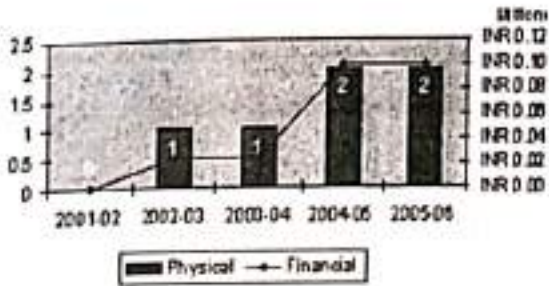


Fig. 5. Physical and financial allocation for state level pre-seasonal training for extension workers on rice

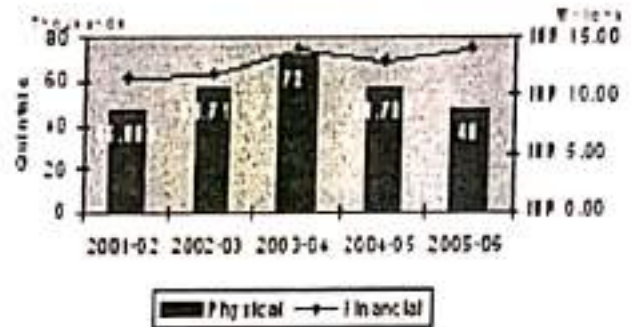


Fig. 9. Physical and financial allocation for subsidy on distribution of certified paddy seeds

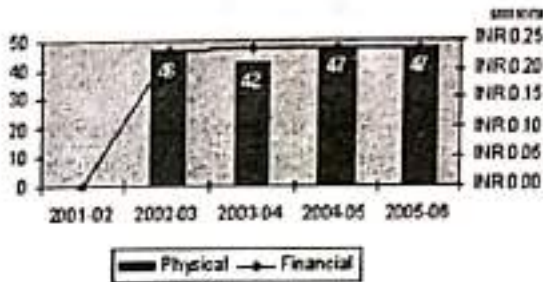


Fig. 6. Physical and financial allocation for district level pre-seasonal training for extension workers on rice

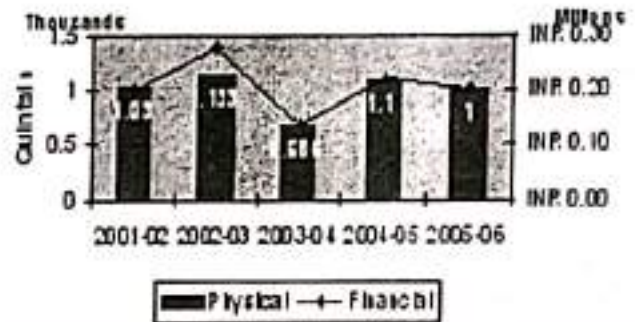


Fig. 10. Physical and financial allocation for incentive on distribution of green manure seeds

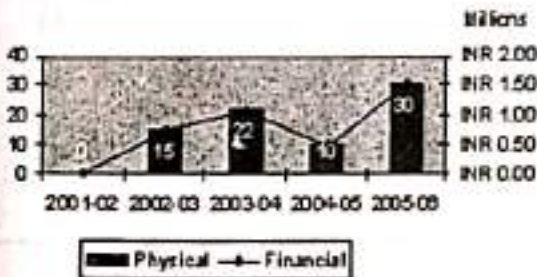


Fig. 7. Physical and financial allocation for district level exhibitions on rice

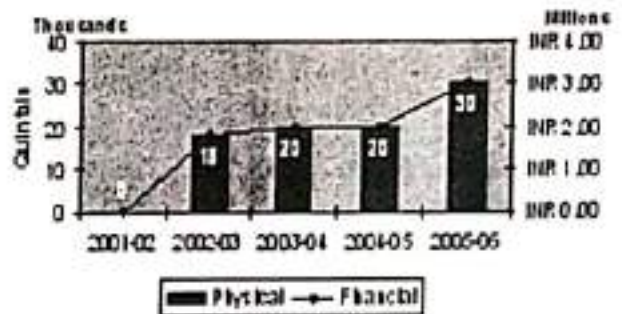


Fig. 11. Physical and financial allocation for incentive on production of certified paddy seeds

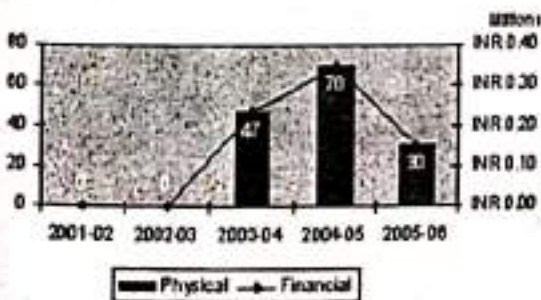


Fig. 8. Physical and financial allocation for specialised training in seed production

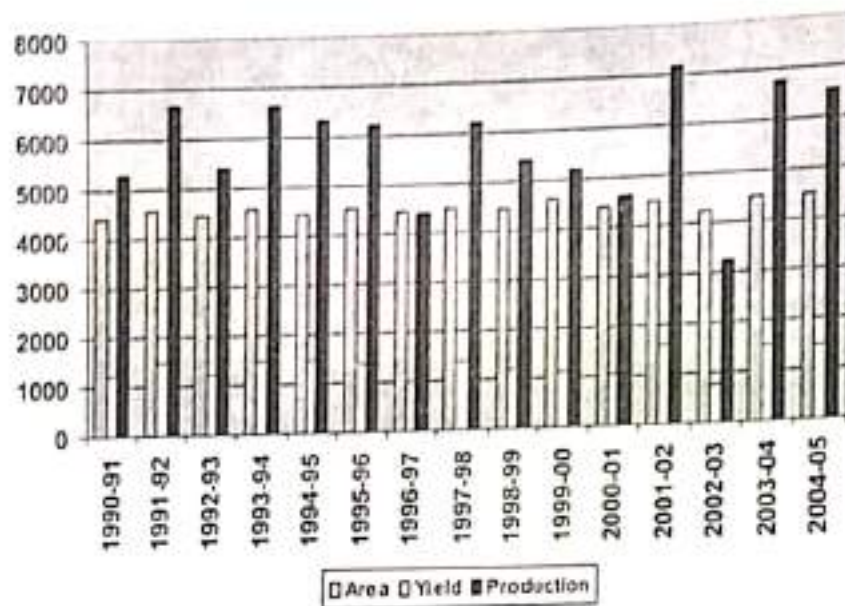


Fig. 12. Area, yield and production of rice in last fifteen years in Orissa

Table 1. Association between participation in rice development scheme and knowledge of rice cultivation among farmers

		Participation in Rice Development Scheme			Total
		No participation	Low participation	High participation	
Total knowledge of rice cultivation practices	Low Knowledge of Rice Cultivation Practices	16	2	0	18
	Medium Knowledge of Rice Cultivation Practices	34	22	2	58
	High Knowledge of Rice Cultivation Practices	2	0	2	4
	Total	52	24	4	80

$\chi^2 = 8.581$; d.f. = 1; Level of Significance = 0.005; $r = 0.431$; Level of Significance = 0.001

Table 2. Association between participation in rice development scheme and adoption of rice cultivation among farmers

		Participation in Rice Development Scheme			Total
		No participation	Low participation	High participation	
Total Adoption of Rice Cultivation	Low Adoption of Rice Cultivation Practices	4	0	0	4
	Medium Adoption of Rice Cultivation Practices	39	22	0	61
	High Adoption of Rice Cultivation Practices	9	2	4	15
	Total	52	24	4	80

$\chi^2 = 5.208$; d.f. = 1; Level of Significance = 0.05; $r = 0.449$ Level of Significance = 0.001

Constraints

The major constraints in the implementation of Rice Development Scheme are as per follows:

- (i) inadequate field staff
- (ii) Top down approach of scheme implementation
- (iii) Untimely release of funds
- (iv) Low extension-farmer contact
- (v) Non-availability of quality seed in time
- (vi) Deployment of field functionaries to Panchayat Raj Department
- (vii) Lack of coordination among line departments.

CONCLUSION

The Rice Development Scheme is a well planned programme of the Directorate of the Agriculture, Government of Orissa. The Work Plan is very clear and understandable with functional and financial details. As per the reports of the Directorate there has been cent per cent achievement against target set for different components of Rice Development Scheme which is quite surprising. INR 365.16 lakhs was the total expenditure

against the sanctioned amount of INR 367.75 lakhs. That means 99.3 per cent funds could be successfully utilized. However, ground reality did not match the claims. The study showed that participation in rice development scheme was significantly positive correlation with the level of knowledge and adoption of recommended rice cultivation practices among the rice farmers. Therefore, it could be concluded that the rice development scheme could succeed in imparting knowledge to farmers leading to adoption of recommended rice cultivation practices.

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Food and Cultural Values of Hidden Harvests in Livelihood of *Adi* Tribe of Arunachal Pradesh

Ranjau K. Singh¹, Amish K. Sureja² and Nancy J. Turner³

ABSTRACT

Many rural people, regardless of whether their agricultural systems are predominantly pastoral, swidden or based on continuous cropping, deliberately incorporate wild resources-so called hidden harvest into their livelihood strategies. Looking to the importance and role of hidden harvest in ensuring the livelihood and food security, an attempt has been made to explore the varieties of culturally and nutritionally important wild resources and local crops species of *Adi* tribe which have not been given much attention at formal and policies level but are significant and integral part of livelihood system. To achieve this objective, 12 *Adi* dominating villages have been selected randomly from the East Siang district, Pasighat, Arunachal Pradesh, northeast India on the basis of their ethnicity, geographical location and floristic diversity. Combinations of methodological tools of conventional and participatory approaches were adopted to explore and record the data. The study demonstrate that for the *Adi* tribe, culturally and nutritionally important hidden harvests have an advantage over the cultivated crops in that their seeds can be preserved and domesticated in shifting and kitchen garden lands and can be grown under the drought conditions also. These season specific wild resources are rich sources of vitamins, protein, micro-nutrients, economically important and marketed through informal networks. The knowledge of hidden harvests are codified into local dialect and communicated through various folk medias and institutions from one generation to another.

Hidden harvest (wild resources) is often critically important to rural people's livelihoods (Scoones *et al.*, 1992; Guijit *et al.*, 1995; IIED, 1997 and Melnyk, 1995). There is growing interest in the role of hidden harvest (wild resources) in local livelihoods. It is increasingly recognized that they are not only important to hunter gatherers, but make substantial contributions to the livelihood strategies of settled farmers, pastoralists and traders in the far-flung areas (Guijit *et al.*, 1995; IIED, 1997; Singh, 2004 and Singh and Sureja, 2006a,b,c). In this cultural significance of hidden harvest study, we aimed to investigate, through evaluation of culturally, economically and important wild resources, the so called hidden harvest, and indigenous crops species. In the traditional communities the accesses and use patterns are most often performed, managed and used collectively applying social

and cultural norms through various institutions and capital (Pretty, 2001 and Pretty, 2003). The hidden harvest study focused on valuing species that are not recognized in government policies and incorporated in formal economic calculations, yet which are often parts of informal agriculture-based economies, livelihood system and culturally significant (Posey, 1999; Gupta, 2003; Turner, 2003). It is essential to recognize the specific characteristics of hidden harvest which confound the use and assessment of traditional methods and thus have contributed to the hidden status on account of their high location and season specific nature. Their importance differs from one social group to another, collected opportunistically, marketed through informal network, used as subsistence product can not be translated immediately into financial terms and values vary according to who has access or control over

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them (Melnik, 1995, IIED, 1997 and Singh and Sureja, 2006a).

Despite the importance at local level, hidden harvest are often overlooked by conventional economic assessment. Undervaluing hidden harvest, leads policy makers to treat many areas as wastelands and thus destroy the existing biodiversity, livelihoods and associated institutions of knowledge who nurture it (Melnik, 1995, Singh, 2004, Singh and Sureja, 2006 a,b,c). Looking to the tremendous importance of hidden harvest (wild resources) and their integration in local agroecosystem, an effort was made to conduct this study in the randomly selected *Adi* tribe dominating villages of East Siang district, Arunachal Pradesh. The objective of the present study was to explore a wide range of *Adi* tribal knowledge and practices in relation to hidden harvest (wild resources) and indigenous agrobiodiversity, culturally important plants and natural resources that affect food security.

METHODOLOGY

Twelve hamlets of *Adi* communities (Balek, Rasam, Yagbo, Runne, Boing, Yangruk, Renging, Napit, Mirbuk, Renging, Mirku and Gune) of the East Siang district, Pasighat, Arunachal Pradesh was selected through random sampling technique. We visited these villages on many occasions, learning from the local people about diverse aspects of their knowledge and practices pertaining to use of hidden harvest. We adapted a number of tools from anthropology and ethnography in our research, including interviews, life histories, case studies and direct participant observation. These methods helped us to shape a consistent story about the relationships between local cultures of ethnic groups, and their conservation, management, production systems and use patterns of indigenous resources. A survey questionnaire, incorporating both open and closed questions, was applied to a conventional mixed sample of 240 community respondents (20 from each village). This survey was the main source of quantitative information on names of hidden harvest, local crop species, and on use patterns and identifying characteristics for different culturally important plants. It also helped to know the cultural relationships with these species over different seasons (IIED, 1997 and Singh and Sureja, 2006a).

We have used participant observations (3 years of interaction and observation at the interval of 1 month in each village), focus group discussions (FGD=12) and field transects (12) (Guijit *et al.*, 1995; IIED, 1997 and Singh and Sureja, 2006a,b,c) to ascertain the validity of hidden harvests. These supplementary discussions yielded

important details about the cultural, livelihood and social aspects of hidden harvests and their dynamic trends (IIED, 1997). Environmental sustainability was assessed through documentation of traditional cultural practices, crop domestication and traditional management methods. The cultural food significance index (CFSI) of collected hidden harvest was assessed using the methods developed by Pieroni (2001), with a slight modification in types of questions and their indicators.

RESULTS AND DISCUSSION

Methodological learning about hidden harvests

To determine the CFSI values of hidden harvest, we carried out interviews with 240 local persons, primarily women, ranging in age between 60 and 80 years and having extensive knowledge of food production and living skills. Respondents were asked to spontaneously list the names of wild edibles and indigenous crop varieties that are gathered and grown for consumption by *Adi* tribal members today. They were also asked, for each identified wild edibles: which part of the plant is used, how the plant part is prepared, the perception of its availability, the frequency of use at present, the taste appreciation and its potential health benefits as a food. The CFSI, specifically elaborated to evaluate the cultural significance of wild resources and local crop species and other edible plants, was calculated using the index as: $CFSI = QI \times AI \times FUI \times PUI \times MFFI \times TSAI \times FMRI \times 10^2$ (Pieroni 2001), where QI expresses the positive frequency of quotation, AI reflects the availability of a crop or plant, FUI represents the frequency of utilization, PUI indicates the plant part used, MFFI designates the multifunctional food use, TSAI is the taste score appreciation and FMRI represents the medicinal role or health values of the food. These values are multiplied by 100 to yield the final index.

These seven indices were multiplied, not added together, in order to amplify the differences in the cultural food significance indices (CFSI). Pieroni (2001) categorized his CFSI values into six classes: very high significance, high significance, moderate significance, low significance, very low significance, and negligible significance. We adopted a mean value as a prime statistical parameter for developing categories of cultural significance for wild resources and local crop species and edible ethnobotanicals. First, the mean CFSI value was calculated and the foods with CFSI values equal to or exceeding this mean were assigned to the category of "very high cultural significance." Those with a calculated CFSI value below this mean were designated as having "high cultural significance," or lower. Similarly, by

following same method, the remaining four categories of "high", "moderate", "low", "very low" and "negligible" cultural significance were determined. The qualitative approach was adopted to facilitate the understanding of exploratory data through use of non-parametric descriptive statistics viz., frequency, percentage, mean score and ranks, in order to draw general inferences (Singh and Sureja, 2006a and IIED, 1997).

Cultural significance of hidden harvests and indigenous crop species

The cultural significance, range and mean of index values of hidden harvests and local crop species are presented in Table 1.

Table 1. Cultural significance and range and mean of index values of hidden harvested wild resources and local crops' species

Level of cultural significance	Index Value		Mean	Standard deviation	Standard error
	Min.	Max.			
Very high	8.10	1327.50	338.40	321.78	38.87
High	8.10	315.00	139.55	88.66	13.50
Moderate	8.00	136.00	71.75	40.13	8.76
Low	8.00	70.00	40.43	24.32	7.33
Very Low	8.00	39.00	18.90	17.42	10.06
Negligible	8.00	09.00	8.85	1.061	00.75

Hidden harvests with very high cultural significance

The group of hidden harvests' species assessed as having very high high cultural significance mainly comprises leafy greens [*marsang* (*Spilanthes acmella* Murr.), *laipatta* (*Brassica campestris* Hook f. & Thoms.), *onger* (*Xanthoxyllum rhetsa* D.C.), *Oyik* (Small herb), *Ongin* (*Clerodendrum colebrookianum* L.), *chengru-tengkhang* (*Amaranthus tricolor* Linn.)]; fruits [(*Kompe perong* (*Embllica officinalis* Gaertn.), *belang* (*Artocarpus heterophyllus* Lam.), *sirang* (*Castanea sp.* Mill.), *kopak* (*Musa paradisiaca* Linn.), *tokowala* (*Ananas comosus* L.) and *rambutan* (*Nephelium laappaceum*)]; vegetables [*Kerela* (bitter gourd), *tang chilli* (*Capsicum sp.*), *koppir* (*Solanum sp.*), *koppy* (*Solanum sp.*), *angitare* (*Beta vulgaris* Linn.), *mula* (radish), *Kalandri* (*Phaseolus lunatus* L.) and *hambotenga* (bamboo)]; *ami* (*Colocasia esculenta* L. var.

Eleusine coracana Gaertn.), which is used for making ethnic beers, also has very high significance. These indigenous taxa of hidden harvests are well known in local gastronomy. All the species of indigenous crops, fruit and other wild edibles included in this category represent the most frequently quoted edibles. Their taste scores are very high (mostly around 10.0) and they play a central role in the daily traditional diet. The economic importance of this group is more (on an average Rs. 40.0/kg) than any other and these foods provide an assured and sustainable means of survival for local women, the one primarily engaged in collecting and selling these and other products in the local market we studied.

Hidden harvest having high cultural significance

The species in this category include mainly cereals and millets [*sphapa* (*Zea mays* Linn.), *amon* (*Oryza sativa* L.) and *ayak* (*Paspalum scrobiculatum* L.); minor indigenous leafy vegetables [*chengruk* (*Amaranthus viridis* Linn.), *ori* (*Coriandrum sativum* L.), *mayang* (*Luffa acutangula* L.), *makoy* (*Solanum nigrum* L.), *dilap* (*Allium cepa* L.), *souri* (*Mentha sp.*) and *lamkhamen* (*Solanum erianthum* D. Don.)]; fruits and vegetables [*bagodi* (*Zyzyphus jujuba* Mill.), *tumpulok* (*Lycopersicon esculentum* Mill.), *onri* (*Carica papaya* L.), *ritsar chilli* (*Capsicum sp.*) and *making* (*Cucumis sativus* L.) and roots and tubers [*singiengen* (*Manihot esculenta* Crantz), *am* (*Viola patrinii* Ging) and *gojar* (*Daucus carota* L.)]. The most commonly gathered species are usually eaten raw in mixed salads or boiled, and are viewed as having "cleansing" properties. The taste appreciation scores for these species were also high (between 9.0 to 10.0). Besides their high cultural significance, these indigenous taxa warrant a second place ranking due to their relatively high economic importance (on an average Rs.30.0/kg) and inclusion of the local varieties in this group.

Hidden harvests of moderate cultural significance

This heterogeneous hidden harvest group consists of species that have a limited role in local kitchens, even though during times of food scarcity they provide food security. Normally they are not used frequently other than in specific food preparations. This group includes mostly local legumes like [*bakla* (*Vicia faba* L.), *Kalandari* (*Phaseolus lunatus* L.), *peron* (*Vigna unguiculata* L.), *ronyang* (*Glycine max* Merrill.) and *sutri* (*Solanum torvum* Sw.) are local vegetables which are boiled before

even though they are economically important and observed to have the value of Rs. 20-25 per kg.

Hidden harvests with low cultural significance

Indigenous millets [*shamula* (*Echinochloa frumentacea* Roxb.) and *samak* (*Echinochloa crusgalli* Beauv.) and ethnic botanicals like *yaimu* (*Zingiber zerumbet* L.), *yaipan* (*Curcuma angustifolia* Roxb.), *kharbuz* (*Cucumis melo* L. var. *momordica*) and *dul's* (*Echinochloa stagnina* Retz.) fell into this group. Many of these species were assigned good taste scores (between 7.5 to 9.0), since most of the local millets are customary items in making ethnic beers. However, due to their limited use as food items they were given a lower ranking for cultural significance. The majority of people (>80%) consuming and depending on local beers made from millets, and not using commercial beer and wine, were in the elderly age category. Their use has played a significant role in the conservation of all the millet crops. Even though these species are more important at some festivals (*Solung* and *Mopin*), the popularity of the millets is comparatively low due to their restricted use by most *Adi* tribal members. However, the economic value of this group from Rs. 15-20 per kg.

Cultural significance of hidden harvests and indigenous crop species

Species that are very rarely used as food, of them quite rare, were grouped in this class. Most of these are herbs, such as [*ankari* (*Vicia sativa* L.) and *jhikka* (*Luffa acutangula* L.)], which are fibrous and tough. These species are occasionally used after mixing them with other softer herbs. Although these species may be used as vegetables and have acceptable taste scores (6.5 to 7.5), they were ranked low because they are not commonly eaten by the *Adi*. The hidden harvest of this group is available in the local market on average with the price of Rs. 10-15 per kg.

Hidden harvests with negligible cultural significance

This class includes the snack-based food item like [*par* (*Benincasa hispida* Thunb.) Cogn.] and *asi tapa* (*Cucurbita maxima* Duchesne L.)] with their use frequency scores of 3.0 and 4.0, respectively. Another in this category is [*engine* (*Amorphophallus campanulatus* Blume.)], which is found wild and, due to its high content of calcium oxalate, it is not preferred, as evidenced by its very low frequency of use score (3.0). The domestication of these species by the women folk, who are the real custodians of indigenous biodiversity, has not been documented so far. The economic values of this

group of hidden harvest have not so far ascertained.

Role of hidden harvests in food systems of *Adi* tribe

Various parts of wild edibles and local crops species in the cultural significance categories are used in the local food system, as follows: fruit (26%), leaves (17%), bark (16%), roots and rhizomes (10%), tender parts (10%), whole plant (6%), shoots (6%) and seeds and stems (6%). It can be inferred that these species are an integral part of *Adi* culture and compatible with their food system, and that they have potential to be further incorporated in biodiversity conservation projects and policy frameworks to enhance the socio-economic status of *Adi* people.

Role of hidden harvests in agricultural production and *in-situ* conservation of genetic resources

Study depicts that *in-situ* conservation through domestication of wild resources in *ghum* and kitchen lands allows for the adaptation of plants and animals to the constantly changing environment of agriculture production system also. For example, in study areas, the local shrub called *Onger* and pummelo (*Citrus grandis* L.) found in dense forest areas are significant part of *Adi* foods. *Onger* leaves are mixed with pork to avoid the infection tapeworms, while pummelo is rich source of vitamin C is used as fruit. Similarly, the red ants (*Oecophyla smaragdina*) eggs are eaten to cure the malaria. Apart from food and human medicinal values these wild resources offer the opportunities to use them as insecticides and biological agents to control the insect pests in paddy and orange crops. The local farmers have been using green leaves of *Onger* and peel of pummelo fruit as repellent against grasshopper in paddy as well as ecofriendly fishing in standing water since the time immemorial. Similarly, the adults of red ants are used as biological agent to control the larvae of trunk borer in orange crop. These practices significantly help in improving the productivity of paddy and orange crops. Thus, acknowledging the wealth of farmers' knowledge about sustainable use of hidden harvest in increasing the productivity, ensuring the food security and maintaining the ecosystem is a step in right direction. Hence, research needs to be conducted with farmers on-farm, rather than in laboratories and field stations (Gujit *et al.*, 1995).

Environmental sustainability of hidden harvests and local agrobiodiversity

Environmental sustainability of reported hidden harvest and indigenous crop species was ascertained by analysing various modes of conservational practices and

seasonal availability (Table 2), revealing that most of these species are conserved through shifting cultivation in association with kitchen garden practices (57.53%, rank I), followed by purely in shifting land (28.76, rank II) and in kitchen gardens (12.33 %, rank III), respectively. It seems that *Adi* tribal people are somewhat increasing their commercial cultivation of local plants (1.4%), while at the same time, several local plants (1.4%) are harvested from the forest as alternative foods, increasing overall food security.

Seasonal availability of different culturally important plant reveals that 28.8 per cent are available year-round (rank I) while 26.0 per cent are harvested only in the rainy season (rank II). About 24.7 per cent of the local plants can be accessed from the rainy season through the winter (rank III) and 13.7 per cent are available only in winter (rank IV). Substantially fewer local crops were identified for their use in the span of winter-to-summer (4.1%). Thus, except during the transitory period of winter-to-summer, year round indigenous crop species and ethnobotanicals provide the *Adi* people with an assured

Table 2. Summary of environmental sustainability and seasonal availability of hidden harvested wild resources and local crops' species

Mode of conservation	Per cent*	Rank+
Commercial cultivation	01.4	IV
Conserved in shifting land	28.8	II
Conserved in shifting land and kitchen gardens	57.5	I
Domesticated in kitchen gardens	12.3	III
Found in forest areas associated with	01.4	IV
Seasonal availability		
Purely in rainy season (From May to September)	26.0	II
Purely in winter (October-April)	13.7	IV
Rainy season to winter (May to October)	24.7	III
Purely in summer(March to May)	02.7	VI
Winter to summer (October to May)	04.1	V
Year round	28.8	I

*Per cent means of the response of respondents towards different modes of conservation and seasonal availability of crops and other plants.

+ Rank means order of importance of particular mode of conservation and seasonal availability of plants.

food supply and income. It can be inferred that nature has provided an ample quantity and variety of natural vegetation of the *Adi* and, from this, they are able to sustain their environment, adopting their own ways of use and conservation.

Conservation of hidden harvests based biodiversity is also mediated through the *Adi* belief system, as reflected in many myths, ceremonies, festivals, spirit entities, and cultural and ethical values in these communities (Singh, 206a). For example, the *Adi* people neither cut nor sell wild banana (*kopak*) as they believe that ghosts will attack them if they do this. To pluck or harvest the wild plants and other local medicine from the forest, the tribal religious leaders must give prior permission. There is a norm that non-tribal members as well as outsiders are not allowed to access the hidden harvest from the forest areas.

Mode of communication and intergenerational transfer of traditional knowledge related to hidden harvests

It is obvious from Table 3 that the traditional knowledge related to access, grading and processing of hidden harvests are transferred from one generation to another by various mode of communication in the *Adi* tribe. The weekly markets are frequent and potential interaction points on hidden harvest and local crops among the community and found as first mode of communication word of mouth was the second important means for intergenerational transfer of traditional knowledge while

Table 3. Mode of communication and intergenerational transfer of traditional knowledge related to hidden harvests and local crop species

Mode of Communication	Mean score	Ranks
Folk songs	27.01	IV
Proverbs	25.36	V
Folk tales	19.57	VII
Folk story	19.76	VI
Word of mouth	69.51	II
Weekly markets	65.95	I
Informal rural social and cultural institutions	41.77	III

Note: The importance of mode of communication sources was measured using three point continuum as most important and least important and have been assigned scores 3, 2, and 1, respectively.

predominance of informal rural social institutions related to accessing the wild resources by rural women and socio-cultural dimension (marriage, cultural functions, festivals, etc.) is one of the best sources of learning and intergenerational transfer as well as making knowledge network about the wild resources which was assigned third rank for its importance.

A range of rich diversities in the cultural and social dynamics of *Adi* communities have their great heritage pertaining to the folk songs, proverbs, folk story and folk tales which were found to be the important modes of communication of the traditional knowledge related to wild ethnobotanical resources codified into the local dialects.

CONCLUSION AND POLICY IMPLICATIONS

It can be concluded that greatest diversity of hidden harvest-ethnobotanical wild resources along with local crops species are found in multi-layered, complex shifting lands and home gardens. These hidden harvests are found in both i.e. undisturbed ecosystems and degraded sites. These resources form integrity with agroecosystem based products and considered indispensable part of food system of *Adi* tribes. Cultural and food values of hidden harvest are decisive factors in conserving and maintaining the biodiversity and ecosystem. Cultural and food values of some wild resources are found to be more important than monetary values. For example, the *ekkam* (*Phrynium pubenerve*) leaves are used in food preservation, storage and making varieties of utensils. The *Adi* living in the far-flung areas and near to dense forests sustain livelihoods and foods solely on the basis of hidden harvest from wild and *jhum* ecosystems. Collection and consumption of these wild resources vary from place to place and gender. Sustainability of these resources are ensured through the domestication and applying various spiritual and cultural norms.

The protection of hidden harvest (ethnobotanical wild resources) and indigenous agrobiodiversity provides some exemplary lessons, which can be applied to ensure the sustainable subsistence survival and food security of tribal peoples such as the *Adi* into the future. Management and sustainable use of hidden harvests for a prosperous future may continue to be based on principles of equitable management and economics that are ensured through understanding the dynamics of culture, livelihoods and related biodiversity. A guaranteed level of hidden harvest should be established for and by the native subsistence group, sufficient to meet their basic needs as

much as permitted by the extent and productivity of the resources. The primary objective of hidden wild resources conservation and sustainable use that have been depleted should ensure that there are adequate mechanisms and opportunities for tribal participation in planning and decision making around the process of recovery and restoration. This study may be useful in contributing to the design and implementation of local needs-based research programs, promoting the application of indigenous knowledge and developing new strategies in formalization of hidden harvest in research and policies and modern resource management and biodiversity conservation, in order to assure lasting sustainability.

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Technical Knowledge of Camel Management Practices in the Arid Thar Desert Environment

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ABSTRACT

Information was collected from 294 camel-keepers in the Thar desert to identify the technical details of camel management and to crosscheck data for relevance testing. A total of 156 practices were identified and scientific relevance values obtained for each. Overall, 95, 37 and 24 practices had high, medium and low relevance values, respectively. In the case of trypanosomiasis, impaction, overall feeding and breeding, the variation between traditional and scientific management practices was found to be significant ($P < 0.01$), but for mange, the variation was not significant. Most single camel owners (54.46%) opted for modern veterinary drugs; owners of >5 camels (47.27%) preferred the traditional approach, while owners of 2-5 camels (43.48%) believed in a mixed management system. The number of camels significantly ($P < 0.01$) influenced these management practices. The study concluded that a balanced combination of traditional and scientific practices can cope better with problems of camel management at grass-roots level, and practices having a high and medium scientific relevance value must be preserved before they are lost.

The camel (*Camelus dromedarius*) is a useful component of the arid environment of desert ecosystem, where the vegetation of marginal land can scarcely meet human requirements for food and energy. Camels are able to sustain 20-22 per cent of body weight loss during severe famine conditions, whereas other livestock, such as cattle and buffalo, can not sustain losses beyond 10-12 per cent (Sahani and Mehta, 2004). Mainly due to the short payback period and higher cost-benefit ratio, the carting- and farming use of camels is profitable and advantageous in arid environments. The world camel population is 19.32 million, with 1.03 million camels in India. The Indian camel population is mainly confined to the northwestern states, with the highest density in Rajasthan.

Ethno-veterinary practices are used extensively, effectively, for keeping camels healthy by employing the knowledge passed on verbally from generation to generation. Technical knowledge represents an indigenous process for camel production and management

among camel-keepers. The principal focus of camel production and management is health, feeding, breeding and economics. Despite the effectiveness of modern veterinary drugs, their availability, accessibility and cost still remain a major constraint for camel-keepers. So, they still prefer and rely on various practices to cope with problems, which include traditional, as well as scientific, management practices. They use one or a combination of practices, and drug dose and frequency depend upon the severity of the disease. Camel-keepers have extensive traditional technical knowledge, which is a somewhat ecological approach to manage health problems. Traditional technical know-how is often cheap, safe, time-tested and based on easily available resources. It can also provide a useful alternative to conventional practices. There is a strong reliance by farmers on the technical knowledge, with respect to suitable plant identification, classification, feed supplementation, local reproduction, breeding, milking and surgical techniques. It is, therefore,

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necessary to investigate the prevalence and scientific relevance of technical knowledge of camel management practices in an arid environment. In the present study an attempt has been made to identify ethno-veterinary practices being practiced by the farmers for sustainable camel rearing in arid environment.

METHODOLOGY

The study investigated camel management practices at grass-roots level in the Thar desert region of Bikaner district. The father of a family generally hands down all technical knowledge to their sons, who continue with the practice.

The task of identifying technical knowledge was accomplished by a pilot study, with a questionnaire on different management aspects. Based on the pilot survey, a detailed interview schedule was prepared. The required data were collected in a suitably developed and pre-tested questionnaire by an in-depth survey method. This grass-roots level study covered various aspects of camel management practices, viz. social status of camel-keepers, ongoing agriculture practices, number of livestock technical knowledge of camel health hazards, treatment pattern, feeding, breeding, surgical management practices, economics, etc. The scientific relevance score test (Sethi and Malaviya, 1996) for each management practice was estimated, based on the experience and opinions of 35 veterinarians and scientists. Scientific relevance test (SRT) is an evaluation that depends upon four major factors: availability, accessibility, cost, effectiveness of resources.

Respondents were selected using a stratified random-sampling technique. Information were collected from sample farmers both in irrigated and non-irrigated villages of the Thar desert. Technical knowledge of camel management practices were meticulously recorded from 294 camel-keepers of six tehsils belonging to 14 villages (Bikaner district), viz. Lunkaransar, Khajuwala, Pugal, Sattasar, Jamsar, Mahajan, Katriyasar, Bikaner, Nokha, Badnu, Kuchor, Jasrasar, Kolayat and Napasar. A sample of 20-22 experienced camel-keepers was drawn from each village randomly for data collection.

RESULTS AND DISCUSSION

Details of the technical knowledge for camel management, indicating traditional, as well as scientific, practices have been reported in Table 1. For treatment of *mange*, endosulphon/melathion and neem combination had a high SRT value, whereas *rohira* bark + whey application had a low value. Kohler-Rollefson (1994)

reported that the Indian *Raikas* also used pulverized bark of the *rohira* + whey. Sulphur+engine oil had a medium SRT value, while sulphur + coppersulphate + *mansil* + potash + oil had an SRT value of 0.88. A butter-milk application was of medium relevance, but used by a large number of respondents.

As regards treatment for contagious skin necrosis, practices were of high relevancy. Salty soils and salt water have been shown to have preventive properties in a number of livestock health problems (Namanda, 1998). Ringworm was well managed by zinc oxide application. Gupta (1999) reported the use of burnt cow-dung in such cases. Camel-keepers have extensive traditional technical knowledge of a rather ecological approach for managing trypanosomiasis: a satawar/turmeric combination and allopathic drugs (quinapyramin sulphate + quinapyramin chloride) had high SRT values. The *dholmungsuri/tumba* combination was of medium value, but was used by large number of farmers. Kohler-Rollefson (1994) reported the use of *tumba* + salt + water as an oral treatment for trypanosomiasis. For managing impaction, most practices were of high SRT value: 22.11 per cent of farmers favoured fast movement to get rid of impaction. Maximum mortality in camels (48.78%) involved problems of the digestive system (Mehta *et al.*, 2003).

In case of pneumonia, a *babul* root and ginger combination had a medium to high relevancy. To combat other respiratory problems, *gundh* of *babul* was more effective. Gupta (1999) recorded the use of powdered *methi*, or seeds, with saffron oil in cases of pneumonia in camels. Incidences of camel pox were managed by practices having high relevancy. Deworming of camels was accomplished very successfully by feeding a copper sulphate/ *chiraita* combination.

Diarrhoea problems were resolved with rice combinations, which had medium SRT values; higher values were also found in cases of feeding with *khejri* leaves and *bui* root. To control diarrhoea in sheep, Kumar (2002) found that the use of barley (*Hordeum vulgare*) flour + rice starch had a SRT value of 0.54 and was used by 73.33 per cent of farmers.

Abscess/wound/saddle gall problems were treated by 20 different practices. Neem, turpentine oil, *kapoor*, *loresine/himax* cream and applying a hot iron to the affected part were found to have higher SRT values. Chronic wound/abscess and inflammation problems are often treated by burning the affected areas with hot iron rods in different forms and patterns, or with crude surgery.

Table 1. The technical knowledge for camel management.

Technical knowledges	% Distribution	SRT* Value
Mange		
Sulpher + Engine oil - paste -apply	22.79	0.56
Engine oil + Alam (hydrated aluminium potassium sulfate salt) - apply	19.04	0.50
Burnt engine oil -apply	10.88	10.58
Endosulphon/ melathion + water - apply	14.63	0.81
Melathion/ Endosulphon + Butter milk -apply	10.54	0.48
Endosulphon + Til oil (<i>Sesamum indicum</i>)-apply	4.08	0.25
Endosulphon + Ash-apply	6.12	0.27
Neem (<i>Azadirachta indica</i>) leaves boil in water-cool-apply	15.97	0.74
Neem leaves (tender)-feed	11.22	0.68
Garlic (<i>Allium sativum</i>)-feed	9.18	0.46
Garlic + Turmeric (<i>Curcuma longa</i>) + Water -drench	6.80	0.38
DDT + whey -apply	6.12	0.19
Bark of Rohira (<i>Recomella undulata</i>) +Whey -apply	9.18	0.18
Slightly warm mustard oil (<i>Brassica campestris</i>) -apply	21.09	0.53
Dalda ghee -drench	10.20	0.45
Jaf's ash (<i>Salvadora oleoides</i>)=Kheemp's (<i>Leptadenia pyrotechnica</i>) juice-apply, after that Taramira oil apply.	22.11	0.57
Taramira oil (<i>Eruca sativa</i>)-apply	13.95	0.55
Sulpher + Copper sulphate + Mansil + Potash + oil -apply	11.56	0.88
Buter milk-apply	11.90	0.27
Contagious skin necrosis		
Salt(100-200 gm)-feeding for 8 to 10 days	10.88	0.94
Keeping separate from other animal	9.86	0.86
Ring worm		
Zinc oxide-apply	16.67	0.61
Aak (<i>Calotropis procera</i>) juice-apply	15.65	0.53
Ghee + Salisalic + Benzoic acid-apply	12.58	0.65
Neem leaves-apply	14.29	0.69
Trypanosomiasis		
Satawar (<i>Asparagus racemosus</i>) + Buffalo milk-feed in repeated dose	9.86	0.77
Turmeric + Buffalo milk - feed in repeated dose	11.22	0.76
Dholmungsuri(<i>Phaseolus sublobatus</i>) + Buffalo milk-repeated dose	21.08	0.56
Salt+Kalajira+Ajwain+Methi powder+Molasses+Alam+Water-drench	18.37	0.57
1/2kg Dalia of Bajri + 1 kg molasses + 100g Red Chilies powder + 100 gm Alam+ Hinge-feed	13.95	0.12
Saji (<i>Salsola baryosma</i>) +Water-drench	17.69	0.17
Suspension of tumba (<i>Citrullus colocynthis</i>) +salt+water-feed	15.99	0.32
Kalajira(<i>Carum carvi</i>) + Hing -feed	14.63	0.64
Injection (Tribaxin/Triquin)	12.24	0.97
Naganoil -3times-3 days-feed	12.93	0.92
Impaction		
Ajwain (<i>Trachyspermum ammi</i>)-feed	13.27	0.71
Ajwain-boil in water-cool-feed	11.56	0.66
Ajwain + Alam +Saji-grinding +water-drench	11.90	0.69
Ajwain+Molasses +Salt-boil-cool-drench	20.75	0.47
Himalayan batisha-feed	7.14	0.60

*SRT-Scientific Relevance Score Test

Technical knowledges	% Distribution	SRT* Value
1/2 kg Sodium bicarbonate mixture + 2kg Patsa-feed	9.18	0.91
Magnesium sulphate + Sodium bicarbonate -feed	10.88	0.94
Alam+ Water -boil and next day drench in early morning	8.50	0.16
Salt water-boil-drench next day in early morning	22.79	0.51
Mustard oil -Water-drench	6.46	0.61
Taramira oil-drench	10.20	0.25
Arandi oil (<i>Ricinus communis</i>)-drench	12.93	0.64
Allow for fast movement	22.11	0.49
Kachri (<i>Cucumis callosis</i>) + Rai (<i>Brassica nigra</i>)-grinding-feed	9.86	0.67
Milk (cow or buffalo) + Sugar-boil-make rich-drench	7.48	0.09
Pneumonia		
Ginger (<i>Zingiber officinale</i>) + Ajwain + Water+ Salt-boil-cool-drench	21.43	0.69
Turmeric + Salt + Ginger+ Water-boil-cool-drench	19.38	0.61
Root of Babul (<i>Accacia nilotica</i>) + water-boil-cool-drench	15.99	0.51
Jaggery (<i>Saccharum officinarum</i>)-feed	13.95	0.17
Mixture of turmeric and jaggery-feed	10.88	0.23
Powdered methi (<i>Trigonella foenumgraecum</i>) + safron oil -feed	6.46	0.15
Ginger + Onion(<i>Allium cepa</i>) + Garlic + Long (<i>Syzygium aromaticum</i>)-feed	20.06	0.67
Other respiratory problems		
Gundh of Babul + water-boil-cool-drench	16.32	0.65
Flour of Jo(<i>Hordeum vulgare</i>) + Alam-boil-feed	11.22	0.15
Flour of Jo-feed	18.03	0.19
Old mehandi (<i>Lawsonia inermis</i>)+Mustard oil-drench	21.09	0.52
Camel pox		
Keeping separate from other animal	15.31	0.78
Dalda ghee-apply	7.14	0.54
Zink oxide-apply	10.88	0.63
Camel milk-apply	3.06	0.38
Deworming		
Red chilies (<i>Capsicum annum</i>) + Water-drench	5.44	0.12
Any tab(Albendazole/Panacure/Nilwarm etc.)-feed	12.59	0.95
Copper sulphate + Tabacco(<i>Nicotiana tabacum</i>) + Castor oil (<i>Ricinus communis</i>)-feed	20.07	0.61
Chiraita(<i>Swertia chirayita</i>)-feed	14.29	0.73
Diarrhoea		
Dalia of Bajri (<i>Pennisetum typhoides</i>) + water-drench	21.42	0.54
Bajri flour + whey-feed	8.50	0.24
Rice(<i>Oryza sativa</i>) grinded + water-boil-feed	23.47	0.51
Dhan flour + water-feed	14.29	0.54
Whey-feed	16.67	0.48
Flour of Jo + water-drench	5.44	0.12
Neblen powder	16.32	0.73
Butter milk + salt-feed	9.18	0.37
Himalayan batisha-feed	12.59	0.64
Khejri leaves(<i>Prosopis cineraria</i>)-feed	22.11	0.62
Root of Bui(<i>Aerva pseudotomentosa</i>) + water-boil-cool-feed	17.35	0.61
Breeding/Reproductive problems: (a) Retention of Placenta		
Bajri-feed	20.75	0.55
Molasses + Wheat (<i>Triticum aestivum</i>)-feed	19.38	0.53
	6.46	0.15

Technical knowledges	% Distribution	SRT* Value
Ajwain + Molasses + water-boil-cool-drench	17.34	0.23
Uteroton/Replanta-feed	15.65	0.76
Manual cleaning + Furia bolus-keep insitu	10.88	0.94
Moth (<i>Psasvolus aconitifolius</i>) + Guar's(<i>Cyamopsis tetragon-loba</i>)Dalia-feed	7.82	0.21
Root bark of Berbush(<i>Zizyphus nummularia</i>) + water-drench	18.68	0.56
(b) Maintenance of Pregnancy		
Ghee + Molasses -feed	14.62	0.69
Methi + Jeggary -feed	15.31	0.22
Molasses + Ginger + Ajwain -feed	13.60	0.15
Moth bean - feed	16.32	0.52
Bajri - feed	22.11	0.54
Abscess/Wound/Saddle Gall		
Ash + Alam - apply and clean	17.68	0.33
Ash apply	14.29	0.18
Neem water -clean wound	10.54	0.88
Neem leaves-grinding-apply	11.22	0.89
Neem leaves -apply and clean by Alam	12.58	0.95
Alam with water -boil - apply	9.86	0.43
Alam + Neem's leaves- grinding- apply	10.20	0.53
Alam heated on tawa and make powder - apply	16.33	0.52
Alam - paste -apply	7.82	0.54
Ker's(<i>Capparis decidua</i>) bark- grinding -apply	8.50	0.40
Phenol-apply	3.74	0.14
Kerosene oil -apply	5.44	0.16
Turpentine oil - apply	13.27	0.87
Turmeric + oil -apply	10.88	0.76
Mustard oil -boil-pour-fire around	20.75	0.41
Kapoor-grinding-apply	9.52	0.63
Potassium per magnate-clean	12.24	0.77
Cream (Lorexine/Himax)-apply	7.48	0.91
Hot iron touch on affect part	20.41	0.60
Sidhur (<i>Bixa orellana</i>)-apply	14.62	0.50
Muscle/tendon pulled		
Mustard oil-apply	23.47	0.49
Turpentine oil - apply	31.97	0.17
Iodex-apply	7.14	0.95
Hot iron touch on affected part	24.49	0.48
Mustard oil + Alam -boil-massage	7.82	0.21
Turmeric + Mustard oil - drench	4.76	0.25
Hot fomentation with alam water/ mud water	25.51	0.80
Mouth ulcer		
Sugar + Alam mix - feed	10.88	0.19
Salt -apply	19.38	0.61
Saji + Water -boil-cool-apply	22.45	0.50
Sudden colic		
1/4 Tobacco heated up + 1 1/2 kg water -drench	13.27	0.15
Ajwain +Water -drench	15.98	0.69
Alam + Water - boil -drench	21.08	0.49

Technical knowledges	% Distribution	SRT* Value
Fracture		
Bark of Gangeray (<i>Grewia tenax</i>) + Milk -drench	16.33	0.73
Muscle Pain		
Methi-feed	17.35	0.69
Alam + Jaggery - feed	22.79	0.71
Exhaustion		
Ghee - feed	11.56	0.74
Molasses + Til oil mix boil - cool -drench	19.73	0.49
Duwa (raw rabri)-drench	7.14	0.17
Jo - grinding + water-feed	14.29	0.83
Alam + Water -feed	13.27	0.71
Tail Gangrene		
Affected part of tail dip in boiled Mustard oil	16.32	0.72
Hot iron touch on affected part	18.37	0.65
Tympany		
1/4 kg Hinge (<i>Ferula asafoetida</i>) + 1/2 kg dalda - feed	18.37	0.65
Magnesium Sulphate + Water -drench	17.35	0.67
Ajwain + salt - feed	7.48	0.56
Salt water -feed	3.74	0.23
Tumba + Salt -feed	15.99	0.61
Make camel to run	5.10	0.17
Any illness		
Molasses - feed	9.52	0.55
Boiled Molasses + Ginger -feed	11.56	0.49
Bajri Dalia -feed	20.75	0.50
Ajwain -feed	10.54	0.51
Alam -feed	22.11	0.66
Maintenance of milking camel		
Methi - feed	8.84	0.51
Methi + Mustard oil - feed	4.08	0.57
Maintenance camel		
Moth bean - feed	14.62	0.51
Ghee + Molasses - feed	17.69	0.67
Guar ki dal - feed	13.27	0.49

To treat placenta retention, root bark of *berbush* + water drenching is of medium relevance, while other practices had high SRT values. Kumar (2002) reported the use of a decoction of molasses, root bark of *berbush* and milk as having SRT value of 0.50, and being used by 87.33 per cent of farmer, for cases of placental retention in sheep. Pulled tendon/muscle cases are often resolved by hot fomentation with mudwater, since mud can retain heat for a longer time on affected parts, facilitating better circulation. Mouth ulcer was well managed by salt and *saji* application. Sudden colic was greatly reduced by drenching with ajwain + water. The bark of the gangeray tree was best in cases of fracture in camels. Muscle pain

could be well managed by feeding a *methi* or *alam* combination. Farmers overcame exhaustion in camels by feeding *Jo*, which is basically lower in thermodynamic substances.

Crude surgical methods have been used to treat cases of tail gangrene and various methods of cauterization employed to halt bleeding. Cauterization was also used for a number of problems connected with the nervous system, locomotion, dislocation, fractures, sprains and injuries (Khanna and Bissa, 1997). The pattern of cauterization varied with the nature of the disease and symptoms. To cope with tympany, a hinge combination

Table 2. Comparison between traditional and scientific management practices of camel rearing

Parameters	Traditional management practices (MPS)	Scientific management practices (MPS)	'Z' value
Disease			
Mange	60.12	39.88	0.21 ^{NS}
Trypanosomiasis	87.23	12.77	6.32 ^{**}
Impaction	83.77	16.23	5.11 ^{**}
Feeding	71.38	28.62	3.34 ^{**}
Breeding	75.44	24.56	4.15 ^{**}

**Significant at $P < 0.01$, NS-Non Significant

was of high SRT value. Tympany in sheep has been treated by giving a mixture of mustard oil + *kachri* + common salt + whey; it had a 0.72 SRT value and was practiced by 93.33 per cent of respondents (Kumar, 2002). Constipation problems were highly resolved by feeding a *kachri*/magnesium sulphate/*tumba* combination, although a few farmers also made camels run to treat constipation. Gupta (1999) reported *ajayan* + salt as being used for treating constipation in camels.

All types of illness were managed by some practice having a medium to high SRT value. Abbas *et al.* (2002) found that ethno-veterinarians have acquired a vast store of information on camel diseases and the use of plant varieties for treatment. Various practices were used in pregnancy, milking or working stages of camel. In fact, farmers have a detailed knowledge regarding roughage, concentrates etc., which is used for balanced feeding or during specific periods when additional nutrient requirements are essential.

A comparison of traditional and scientific management practices in camel rearing is given in Table 2. In cases of mange, the variation between traditional and scientific practices was not significant because a comparatively greater number of farmers used management practices, which were well recognized by the scientific community. As for trypanosomiasis, impaction, overall feeding and breeding, the variation between traditional and scientific management practices was found to be significant ($P < 0.01$). Table 3 expresses the impact of camel numbers on management practices. Most single camel owners (54.46%) opted for modern veterinary drugs, those keeping > 5 camels (47.27%) preferred the traditional approach and the owners of 2-5 camels (43.48%) believed in mixed management. Initially, this group applied traditional practices, but if a cure was not

forthcoming they switched to modern veterinary drugs. A chisquire test was applied and the value was found to be significant, which indicated that the number of camels in the herd significantly ($P < 0.01$) influenced these management practices.

The main purpose of this economic analysis is to support decision making regarding limited resource allocation. Cost of resource provides a basis for making rational choice among alternatives under various circumstances. The treatment cost depends upon severity of particular disease. The traditional treatment cost of *mange* was low as compared to allopathic treatment cost. The traditional treatment cost varied Rs. 20 to 125/- per camel. The allopathic treatment cost varied Rs. 250 to 500/- per camel (injectable type) and Rs. 90 to 160 (spray/application type). The traditional treatment cost of Trypanosomiasis (Rs. per camel) varied Rs. 450 to 1000/- where as allopathic treatment cost varied Rs. 90 to 100/-. The traditional treatment cost for pneumonia varied from Rs. 40 to 80/- per camel per day. Monetary values are used as a common denominator for the valuation of particular resources. This economics indicate the confidence one can have in their priority ranking of various strategies.

All technical knowledge is based on personal experience and is cost effective, arid environmentally sound and socially acceptable. Therefore, this study indicates that a balanced combination of traditional and scientific practices can cope better with problems of camel management at grass-roots level in an arid environment, and the practices having high and medium SRT values must be preserved before they are lost. It will be appropriate to hand over the know-how obtained and refinements achieved back to the arid farmers, and they should be part of the scientific and commercial processes.

Table 3. Impact of number of camel on management practices

	Modern veterinary drugs	Intermixed management (Traditional app + Mod. Vet. Drug)	Traditional approach	Overall
1 Camel	54.46	24.75	20.79	34.35
2-5 Camel	18.12	43.48	38.41	46.94
> 5 Camel	16.36	36.36	47.27	18.71
Overall	30.27	35.71	34.02	N=294
Chi square		44.32**		

**-Significant at P<0.01.

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Information Processing and Sharing Behaviour of IFS Farmers

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ABSTRACT

A study was conducted to assess the information processing and sharing behaviour of farmers in different farming systems of coastal Tamil Nadu during 2005. Almost three-fifth of the total respondents (60.67%) never preserved any literature relating to farming while farmers before to C+D+P+F (5.33%) and C+D+P (10.00%) systems were comparatively better in preserving the literature. The diary writing habit was relatively better in C+D+P+F systems (5.33%) and poor in other systems. Most of the respondents evaluated the information with locally available sources like friends, relatives and progressive farmers. Similarly majority of the respondents shared the information with friends, relatives, neighbours and advise seekers immediately after receiving it in most of the systems. Information sharing behaviour was high among personal localite channels. The extension agencies should inculcate the habit of various methods of information preservation, consultation of different sources for evaluation the information and sharing the same in all farming systems.

Farming system is a way of life among the farmers of India wherein several enterprises are integrated symbiotically and the synergistic interactions of them have a greater effect than the individual effect. In this endeavour, the role and nature of involvement of component enterprises including dairy within the farming systems, development of appropriate research protocols, mechanisms to encourage greater use of profitable technologies, method of diffusion, delivery and acceptance by farmers will assume greater importance for spearheading the agricultural growth. This needs meticulous planning on how to integrate crop, dairy and other enterprises of integrated farming in different agro-eco systems. It is necessary to understand the information processing and sharing behaviour of farmers in order to plan need based strategy for promoting profitable farming systems in the country.

METHODOLOGY

The study was conducted in two randomly selected coastal districts of Tamil Nadu. From these two districts, four blocks and eight villages were selected applying proportionate random sampling technique. A sample of 150 farmers was drawn using the proportional allocation. A complete list of farmers having different enterprise combinations including at least one milch animal was prepared for each of the selected villages. Based on the proportionate random sampling technique, the sample IFS farmers were drawn randomly from the selected villages. The sample IFS farmers were post stratified based on the combination of enterprises.

Information processing behaviour

It was operationalised as activities performed by an IFS farmer for synthesis, evaluation, storage and

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transmission of farm related information. A score of three, two and one was assigned for mostly, sometimes and never responses. For calculating the overall score of information processing behaviour, scores on each item was worked out and summed-up.

Information sharing behaviour

It was operationalised as the tendency of the respondents to share farm oriented information received by IFS farmers with fellow farmers and transmission of farming problems to concerned development departments as feedback. The numerical scores of one for sharing the information immediately after receiving the information and two for sharing the information after adopting the technology or innovation were assigned and overall score was calculated by summing up the individual scores obtained on each of the information shared with others to find out the information sharing behaviour.

RESULTS AND DISCUSSION

Information processing behaviour of IFS farmers

The information processing behaviour of IFS farmers with respect to their method of preservation and evaluation of new information on different farming systems has been described as hereunder.

Preservation of information

The results on method of preservation of new information by IFS farmers in different farming systems have been depicted in Table 1.

As could be seen from the table, more than half of the total respondents (56.00%) only made cursory look without making much effort in understanding what the information/ message was about. Similar trend was observed in all the systems. Almost three-fifths of the total respondents (60.67%) never preserved any literature relating to farming while farmers belonging to C+D+P+F (5.33%) and C+D+P (10.00%) were comparatively better in preserving the literature. About 87.33 per cent of total respondents never maintained a subject matter file. Higher proportion of farmers in C+D+P+F (4.00%) had the habit of maintaining the subject matter files and farmers of C+D+P+H and C+D+P+S/G+H did not follow the same. With regard to noting in a diary about events and accounts, 61.33 per cent of them never noted/ wrote in the diary and 22.67 per cent wrote most of the time. The diary writing habit was relatively better in C+D+P+F (5.33%) and poor in other systems. Majority of the respondents (59.33%) preferred to memorize the new information mostly and 40.67 per cent of them sometimes

memorized the same. Farmers of C+D+P+F+H (6.00) and C+D+P+S/G+H (8.00%) showed greater interest to memorise the new information as a means of preservation.

These findings indicate that the habit of preservation had not been inculcated although educational status of the respondents greatly improved. Farmers generally make a cursory look and memorize the same if they happen to see/ hear the news on radio/ television, from fellow farmers or read the newspaper. The habit of literature preservation, diary writing and maintenance could not be found even among graduate farmers. Generally farmers expressed that since they were fully involved in farming activities from morning to evening, they could not find enough time for these work and moreover, it was not a difficult task for them to remember the income and expenditure at least for current and previous years. However, they could recollect the data on activity wise farming activities the last 5 to 10 years. Hence, one of the major tasks of field extension functionaries is to inculcate the habit of various methods of preservation of information in order to enable the farmers to plan their calendar of activities which will help them in avoiding wasteful expenditures in running the farming on a profitable basis. Kadian and Kumar (2002) found that majority of dairy farmers preserved scientific information by memory.

Method for evaluation

The data in Table 2 display the results of method of evaluation of information by IFS farmers on different farming systems. It could be observed from the Table that about 68.67 per cent of the total respondents discussed the new information with friends/ relatives while more than half of them (52.00%) also evaluated the information by having discussion with progressive farmers. The respondents who mostly evaluated the information with the progressive farmers were proportionately high in C+D+P (14.00%), C+D+P+F (6.00%), C+D+P+H (6.00%) and C+D+P+S/G+H (5.34%) system. It may be due to familiarity with these sources and its ready availability in the vicinity of locality. Moreover, the cross checking and doubt clearing were easy while evaluating the information with these sources. Kadian and Kumar (2002) revealed that evaluation of perceived information was done by discussing with friends, relatives and progressive farmers (87.22%) as well as considering the feasibility and profitability of the innovation. They further suggested the evaluation of cost of alternative and appropriate approaches as a basis for decision making. About 46.00 per cent of respondents never consulted locally available institutions and 28.67 per cent and 25.00 per cent

Table 1. Distribution of respondents according to their method of information preservation (N=150)

Method of Preservation	System						Overall
	C+D	C+D+P	C+D+P+F	C+D+P+S/G	C+D+P+H	C+D+P+S/G+H	
I. Only through cursory look							
i) Never	1 (0.67)	0 (0.00)	2 (1.33)	3 (2.00)	3 (2.00)	1 (0.67)	10 (6.67)
ii) Sometimes	21 (14.00)	25 (16.67)	6 (4.00)	17 (11.33)	7 (4.67)	8 (5.33)	84 (56.00)
iii) Mostly	13 (8.66)	20 (13.33)	4 (2.67)	10 (6.67)	3 (2.00)	6 (4.00)	56 (37.33)
II. Preserve literature to use when needed							
i) Never	22 (14.67)	25 (16.67)	4 (2.67)	21 (14.00)	8 (2.67)	11 (7.33)	91 (60.67)
ii) Sometimes	7 (4.66)	5 (3.33)	0 (0.00)	4 (2.67)	4 (2.67)	3 (2.00)	23 (15.33)
iii) Mostly	6 (4.00)	15 (10.00)	8 (5.33)	5 (3.33)	1 (0.67)	1 (0.67)	36 (24.00)
III. Maintain a subject matter file							
i) Never	31 (20.67)	41 (27.33)	4 (2.67)	27 (18.00)	13 (8.67)	15 (10.00)	131 (87.33)
ii) Sometimes	2 (1.33)	3 (2.00)	2 (1.33)	2 (1.33)	0 (0.00)	0 (0.00)	9 (6.00)
iii) Mostly	2 (1.33)	1 (0.67)	6 (4.00)	1 (0.67)	0 (0.00)	0 (0.00)	10 (6.67)
IV. Note in a diary							
i) Never	23 (15.33)	30 (20.00)	2 (1.33)	21 (14.00)	7 (4.67)	9 (6.00)	92 (61.33)
ii) Sometimes	5 (3.33)	8 (5.33)	2 (1.33)	3 (2.00)	2 (1.33)	4 (2.67)	24 (16.00)
iii) Mostly	7 (4.67)	7 (5.33)	8 (5.33)	6 (4.00)	4 (4.00)	8 (1.33)	34 (22.67)
V. Memorise it							
i) Never	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
ii) Sometimes	15 (10.00)	18 (12.00)	6 (4.00)	15 (10.00)	4 (2.67)	3 (2.00)	61 (40.67)
iii) Mostly	20 (13.33)	27 (18.00)	6 (4.00)	15 (10.00)	9 (6.00)	12 (9.00)	89 (59.33)

C - Crop; D - Dairy; P - Poultry; F - Fishery; S/G - Sheep/Goat and H - Horticulture
 Figures in parentheses indicate percentage.

per cent of them consulted mostly and sometimes respectively.

Only C+D+P+F (6.00%) and C+D+P (9.33%) farmers had higher proportion in consulting the local institution. Vast majority of the respondents (65.33%) preferred to evaluate the new information based on the availability of inputs and profitability of innovations and

only miniscule minority of respondents (14.67%) did not consider their criterion. The C+D+P+F farmers (5.33%) were mostly immediate adopters of innovations. The results disclosed that those with higher risk taking ability were adopting multiple enterprises and were having contact with various stakeholders of the system and to try to take the advantages of prevailing factors of

Table 2. Distribution of respondents according to their method of information evaluation (N=150)

Method of Evaluation	System						Overall
	C+D	C+D+P	C+D+P+F	C+D+P+S/G	C+D+P+H	C+D+P+S/G+H	
I. Consultation with friends/ relatives							
i) Never	0 (0.00)	4 (2.67)	1 (0.67)	0 (0.00)	0 (0.00)	0 (0.00)	5 (3.33)
ii) Sometimes	20 (13.33)	29 (19.33)	8 (5.33)	22 (15.67)	10 (6.67)	14 (9.33)	103 (68.67)
iii) Mostly	15 (10.00)	12 (8.00)	3 (2.00)	8 (5.33)	3 (2.00)	1 (0.67)	42 (28.00)
II. Consultation with progressive farmers							
i) Never	2 (1.33)	4 (2.67)	1 (0.67)	10 (6.67)	0 (0.00)	2 (1.33)	19 (12.67)
ii) Sometimes	16 (10.67)	20 (13.33)	2 (1.33)	6 (4.00)	4 (2.67)	5 (3.33)	53 (35.33)
iii) Mostly	17 (11.33)	2 (1.33)	9 (6.00)	14 (9.33)	9 (6.00)	8 (5.33)	78 (52.00)
III. Consultation with local institutions							
i) Never	16 (10.66)	18 (12.00)	1 (0.67)	20 (13.33)	7 (4.67)	7 (4.67)	69 (46.00)
ii) Sometimes	10 (6.67)	13 (8.67)	2 (1.33)	1 (0.67)	5 (3.33)	7 (4.67)	38 (25.33)
iii) Mostly	9 (6.00)	14 (9.33)	9 (6.00)	9 (6.00)	1 (0.67)	1 (0.67)	43 (28.67)
IV. Consider the availability of inputs and profitability of innovations							
i) Never	3 (2.00)	4 (2.67)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	7 (4.67)
ii) Sometimes	12 (8.00)	14 (9.33)	2 (1.33)	10 (6.67)	1 (0.67)	6 (4.00)	45 (30.00)
iii) Mostly	20 (13.33)	27 (18.00)	10 (6.67)	20 (13.33)	12 (8.00)	9 (6.00)	98 (65.33)
V. Wait for demonstrations in other's farm							
i) Never	7 (4.67)	13 (8.67)	8 (5.33)	3 (2.00)	3 (2.00)	2 (1.33)	36 (24.00)
ii) Sometimes	22 (15.33)	19 (12.6)	4 (2.67)	10 (6.67)	6 (4.00)	8 (5.34)	70 (46.67)
iii) Mostly	5 (3.33)	13 (8.67)	0 (0.00)	17 (11.33)	4 (2.67)	5 (3.33)	44 (29.33)

C - Crop; D - Dairy; P X Poultry; F - Fishery; S/G ā Sheep/Goat and H - Horticulture
 Figures in parentheses indicate percentage.

production and their method of evaluation. Those farmers who take into consideration of backward and forward linkages in a system perspective are always ahead of others as they evaluate any information which they come to know with various system components which ultimately help them to take right decision.

Information sharing behaviour

The information sharing behaviour was described in relation to immediate sharing of information with different sources after knowing it or passing the information after adopting the innovations in their own farm by the farmers.

The study showed respondents passed on the information to friend and relatives (53.33%) followed by neighbours (49.33%), advisor seekers (48.00%), tenants (16.67%) and agricultural meetings (0.67%) respectively. On the other hand, other farmers preferred to pass on the information after adopting the same in their farm setting to friends and relatives (46.67%), neighbours (43.99%), advise seekers (43.33%), tenants (14.01%), agricultural meetings (10.6%) and by writing articles (1.33%). The farmers belonging to C+D+P+F, C+D+P+H systems and C+D+P+S/G+H mostly shared the information after verifying the same in their farms while those belonging to C+D, C+D+P and C+D+P+S/G systems mostly passed on the information immediately after coming to know it. It could be inferred that the systems containing risk factors require the technologies or innovations first to be verified before passing the same whereas those systems practised by resource poor farmers with low value crops/enterprises may not require such verifications as risk factors contained in the innovations may be of relatively lower order. Farmers of C+D+P+F also shared their results in agricultural meetings as well as writing articles/ preparing pamphlets in the slang language to popularise certain innovations/ enterprises. It was also found that the technologies that were shared with others after adoption in their farms by the farmers included pest and disease control measures, new high value crops like flowers, etc. and technologies that were passed immediately were insect control measures, seed availability and market related information. Garg and Saini (2004) suggested that extension agencies need to educate the farmers about quality, value addition, diversification and better marketing

so that it can be shared among the farmers. It could be concluded that the information sharing behaviour was high among personal localite channels and low among impersonal cosmopolite channels. These findings implied that commodity specific group formation is urgently warranted in each and every village of the country.

CONCLUSION

The findings revealed that almost three-fifth of the total respondents never preserved any literature relating to farming while farmers belong to C+D+P+F (5.33%) and C+D+P systems were comparatively better in preserving the literature. The diary writing habit was relatively better in C+D+P+F and poor in other systems. Most of the respondents evaluated the information with locally available sources like friends, relatives and progressive farmers. Similarly, majority of the respondents shared the information with friends, relatives, neighbours and advise seekers immediately after receiving it in most of the systems. Information sharing behaviour was high among personal localite channels.

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Gain in Knowledge of Farmers due to Multimedia Training Programme

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ABSTRACT

The investigation aimed at assessing the impact of multimedia kit on gain in knowledge of farmers about high-tech agriculture. The study was conducted among 240 young farmers in four selected districts of Punjab. The multimedia kit developed for the study consisted of booklets, charts, flip-books and CDs. The study revealed that the multimedia kit was useful in enhancing the knowledge level of young farmers' in various aspects of agricultural technologies.

Training of young farmers is one of the important activities in transfer of farm technologies. Training can be made most effective by use of different media in imparting knowledge and skill to the farmers. However, there is a dearth of availability of multimedia kit which can be used in imparting training on high-tech agriculture. There is also a need to assess the impact of multimedia kit in gain on knowledge. Keeping this in view the present study was undertaken to investigate the gain in knowledge level of farmers due to use of multimedia kit in training programmes.

METHODOLOGY

Locale of the study

For this study four districts where KVKs have been established i.e., Kapurthala, Nawanshehar, Patiala and Ferozpur were selected. From each district three blocks were selected purposively as per advice of the experts of KVK, and from each block one village was selected. 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.

Gain in knowledge

Gain of the knowledge of the young farmers was studied with the help of knowledge test developed for this purpose. The pre knowledge level of young farmers was assessed before using the multimedia kit during the Personal Contact Programmes (PCPs) and knowledge level was again studied after the exposure to the multimedia kit. The gain in knowledge test comprised of various items concerning different cultivation practices of different crops (Wheat, Rice, Sugarcane) and also the items pertaining to subsidiary occupations (Dairy Farming, Poultry Farming, Mushroom Cultivation and Bee Keeping) 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.

The multimedia kit developed for this study consisted of booklets, charts, flip-books and CDs.

RESULTS AND DISCUSSION

The data in Table 1 revealed that there was significant gain in knowledge in various aspects of

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wheat cultivation i.e., time and method of sowing, irrigation, harvesting and threshing, seed treatment, weed control, seed rate, plant protection measures, minor nutrients deficiency, fertilizer application and selection of varieties. It can be further inferred from the Table that the maximum gain in knowledge was in case of selection of varieties followed by fertilizer application, minor nutrients deficiencies, plant protection measures, seed rate, weed control, seed treatment, harvesting and threshing, irrigation and time and method of sowing the crop. The mean scores of gain in knowledge regarding different aspects of wheat cultivation ranged from 0.18 to 0.50. The differences in mean knowledge level score were also statistically significant.

The data in Table 2 show that pre and post training mean knowledge scores with respect to rice cultivation. The gain in knowledge was found to be statistically significant. The maximum gain in knowledge was in case of nursery sowing followed by seed treatment, plant protection measures, selection of soil, weed control, fertilizer application, transplantation, zinc deficiency, harvesting and threshing, seed rate and selection of varieties. In the areas such as zinc deficiency

and plant protection measures, the young farmers had comparatively less knowledge but after the training programmes their knowledge level increased in all the sub areas of rice cultivation.

It can be observed from Table 3 that the differences in pre and post training mean knowledge scores were significant at one per cent level of significance in various sub areas of sugarcane cultivation. The maximum difference in the gain in knowledge was found in case of plant protection measures followed by weed control, seed rate and seed treatment, fertilizer application, selection of soil, time of planting, selection of varieties and irrigation practices. The gain in knowledge score ranged from 0.16 to 0.53.

The data in Table 4 reveal that there was significant in knowledge in the sub area i.e., knowledge about cattle breeds and their characteristics (0.61) followed by health care, selection of adult animals, silage and hay making, balanced feed, cattle breeding, care of calves, productive use of dairy waste, housing for animals and

Table 1. Gain in knowledge of young farmers about various aspects of wheat cultivation

(N=240)

Sr. No.	Wheat cultivation	Pre-test mean knowledge score	Post-test mean knowledge score	Gain in knowledge	't' value
1.	Selection of varieties	0.37	0.87	0.50	12.25*
2.	Seed rate	0.59	0.92	0.33	9.25*
3.	Seed treatment	0.45	0.73	0.28	15.00*
4.	Time and method of sowing	0.63	0.81	0.18	7.00*
5.	Weed control	0.40	0.70	0.30	6.50*
6.	Fertilizer application	0.21	0.69	0.48	23.50*
7.	Minor nutrients deficiency	0.13	0.56	0.43	10.00*
8.	Irrigation	0.76	0.95	0.19	9.33*
9.	Plant protection measures	0.26	0.65	0.39	10.16*
10.	Harvesting and threshing	0.63	0.83	0.20	9.00*

* Significant at 1 per cent level of significance.

Table 2. Gain in knowledge of young farmers about various aspects of rice cultivation

(N=240)

Sr. No.	Rice cultivation	Pre-test mean knowledge score	Post-test mean knowledge score	Gain in knowledge	't' value
1.	Selection of soil	0.54	0.89	0.35	25.00*
2.	Selection of varieties	0.58	0.75	0.17	7.00*
3.	Seed rate	0.44	0.65	0.21	6.25*
4.	Seed treatment	0.34	0.81	0.47	10.50*
5.	Nursery sowing	0.36	0.86	0.50	9.25*
6.	Transplantation	0.35	0.65	0.30	12.30*
7.	Fertilizer application	0.38	0.71	0.33	9.0*
8.	Zinc deficiency	0.29	0.53	0.24	8.40*
9.	Weed control	0.34	0.67	0.33	16.33*
10.	Plant protection measures	0.27	0.65	0.38	10.75*
11.	Harvesting and threshing	0.71	0.93	0.22	9.00*

* Significant at 1 per cent level of significance.

Table 3. Gain in knowledge of young farmers about various aspects of sugarcane cultivation

(N=240)

Sr. No.	Sugarcane cultivation	Pre-test mean knowledge score	Post-test mean knowledge score	Gain in knowledge score	't' value
1.	Selection of soil	0.47	0.74	0.27	16.25*
2.	Selection of varieties	0.57	0.77	0.20	12.85*
3.	Seed rate and seed treatment	0.53	0.85	0.32	8.75*
4.	Time of planting	0.56	0.81	0.25	8.40*
5.	Weed control	0.29	0.63	0.34	9.5*
6.	Irrigation practices	0.68	0.84	0.16	9.25*
7.	Fertilizer application	0.47	0.76	0.29	12.50*
8.	Plant protection measures	0.32	0.85	0.53	10.00*

* Significant at 1 per cent level of significance.

Table 4. Gain in knowledge of young farmers about various aspects of dairy farming

(N=240)					
Sr. No.	Dairy farming	Pre-test mean knowledge score	Post-test mean knowledge score	Gain in knowledge score	't' value
1.	Knowledge about cattle breeds and their characteristics	0.06	0.67	0.61	8.50*
2.	Selection of adult animals	0.25	0.75	0.50	6.50*
3.	Cattle breeding	0.36	0.81	0.45	9.30*
4.	Balanced feed	0.32	0.79	0.47	18.00*
5.	Silage & hay making	0.33	0.83	0.50	15.00*
6.	Health care	0.29	0.85	0.56	8.40*
7.	Housing for animals	0.41	0.78	0.37	21.00*
8.	Care of calves	0.28	0.72	0.44	8.40*
9.	Maintenance of dairy farm records	0.25	0.62	0.37	12.25*
10.	Productive use of dairy wastes	0.53	0.91	0.38	14.00*

* Significant at 1 per cent level of significance.

maintenance of dairy farm records. The gain in knowledge scores ranged from 0.37 to 0.61.

The study showed that there was significant gain in knowledge in case of training on poultry farming. The farmers had a significant gain in knowledge in sub-areas such as knowledge about the nutritive value of poultry products, followed by purchase of chicks, poultry breeds & their characteristics, hatching and care of chicks, poultry feed, poultry diseases and their preventive measures and control. The gain in mean knowledge scores varied from 0.38 to 0.59.

The study also revealed (Table 5) show that there was significant gain in knowledge in various aspects of mushroom cultivation i.e., different varieties/ types of mushroom cultivation, different spawns, compost preparation, type of containers used for filling the compost for spawning, different methods of spawning, maintenance of proper relative humidity in the compost, sprinkling methods for irrigation, harvesting and marketing the mushrooms. The maximum gain in knowledge was

in case of different methods of spawning following by sprinkling methods for irrigation, knowledge about different spawns, compost preparation, knowledge about type of containers used for filling the compost for spawning, maintenance of proper relative humidity in the compost, knowledge about different varieties/ types of mushroom cultivation and harvesting and marketing mushrooms. The mean scores of gain in knowledge ranged from 0.34 to 0.78.

The data in Table 6 reveal that there was gain in knowledge in case of training in bee keeping. The farmers had a significant gain in knowledge in sub-areas such as, purchase and rearing of colonies (0.56) followed by extracting and marketing of honey and multiplication of bees, use of different bee-keeping and honey extraction equipments, prevention and control from insects and diseases and transferring of boxes to bee flora. The gain in knowledge score ranged from 0.42 to 0.56.

Table 5. Gain in knowledge of young farmers about various aspects of mushroom

(N=240)

Sr. No.	Mushroom cultivation	Pre-test mean knowledge score	Post-test mean knowledge score	Gain in knowledge score	't' value
1.	Knowledge about different varieties/ types of mushroom cultivation	0.16	0.61	0.45	24.00*
2.	Knowledge about different spawns	0.12	0.75	0.63	9.00*
3.	Compost preparation, knowledge about type of containers used for filling the compost for spawning	0.21	0.78	0.57	7.25*
4.	Different methods of spawning	0.03	0.81	0.78	6.85*
5.	Maintenance of proper relative humidity in the compost	0.12	0.69	0.57	10.75*
6.	Sprinkling method for irrigation	0.21	0.85	0.64	14.25
7.	Harvesting and marketing	0.39	0.73	0.34	12.00*

* Significant at 1 per cent level of significance.

Table 6. Gain in knowledge of young farmers about various aspects of bee keeping

(N=240)

Sr. No.	Bee keeping	Pre-test mean knowledge score	Post-test mean knowledge score	Gain in knowledge score	't' value
1.	Purchase and rearing of colonies	0.22	0.78	0.56	12.00*
2.	Use of different bee-keeping and honey extraction equipments	0.37	0.81	0.44	10.50*
3.	Prevention and control from insects and diseases	0.25	0.68	0.43	15.00*
4.	Transferring of boxes to bee flora	0.32	0.74	0.42	9.00*
5.	Extracting and marketing of honey and multiplication of bees	0.36	0.85	0.49	8.25*

* Significant at 1 per cent level of significance.

CONCLUSION

The study has shown that the multimedia kit (consisted booklets, charts, flip-books and CDs) used in the study was found to be useful in improving the knowledge level of young farmers in various aspects

agricultural technologies. Therefore it is recommended that the use of multimedia kit should become an essential component of training of farmers and farm women to impart knowledge and skills related to various farm technologies.

Motivational Profile of Farmers in Doon Valley Watershed Project

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ABSTRACT

The study analysed the motivational profile of farmers of selected villages of Doon Valley integrated watershed management project. A comparison of motivational profile of successful and less successful project villagers showed that the two groups of respondents were more or less the same with regard to achievement motivation. But the social achievement motivation of farmers of successful villages was higher than those of from less successful villages.

The Doon Valley Integrated Watershed Management' project was initiated in June 1993 by the Government of Uttar Pradesh with technical and financial assistance of European Commission, which focussed on the participatory and integrated approach to watershed management. The project aimed at socio-economic development of local people through community participation was channeled through people's institutions created for the purpose. *Gaon Resource Management Association* (GAREMA), Self Help Group (DHG) and Users Group (UG) created by the project, were considered as people's institutions. This paper discusses the motivational profile of the farmers successful and less successful villages.

METHODOLOGY

The study was conducted in six villages of the Doon valley integrated watershed management project to measure the motivation profile of the farmers in Doon valley during 1998. Two villages from each division of Dehra Dun, Rishikesh and Laksi were selected for this study one the most successful and another the least successful (as classified by the project staff on basis of their project accomplishments). Fifty-one respondents from three villages where the project found to be successful and forty-five respondents from three other

villages where project was less successful formed the sample of respondents for this study. While studying in Indian situation, Bhargava (1984) and several other researchers were of the opinion that Thematic Apperception Test (TAT) was the best measure of motive since it is an operant measure, all other measures are respondent type. Response to a question is generally cognitive and not affective whereas motive is essentially affective in nature. It was, therefore, decided to use TAT type instrument to measure personal achievement, social achievement and influence motive of the respondents in the present investigation. The instrument consisted of four TAT type pictures developed by Mehta (1976, 1994), which were used to elicit fantasies and inageries in the form of stories. These stories were then scored to empirically assess the motive strengths of the respondents as per the scoring manual developed by Mehta (1994). For the present study data were collected from eighty agricultural scientists/officials from ICAR institutes and SAUs with the help of TAT type picture developed by Mehta (1994).

RESULTS AND DISCUSSION

The fantasies (imaginative stories) written by the farmers were analyzed following the scoring system developed by Mehta (1976) for personal achievement

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motivation, social achievement and influence motivation. Some of the stories written by the respondents contained cues for more than one motive. Such stories were scored for all the motives contained. This gave rise to additional categories based on various combinations of the three motives. Thus the fantasies obtained from the respondents were finally scored for the seven categories as reported in Table 1.

Total respondents being 86, there were 394 (96x4) stories written or told by them. Out of these only 192 stories contained cues for motivation. The remaining 192 stories (50 per cent) were unrelated.

The data reported in Table 1 further showed that 74 of the 192 stories with motivational cues, i.e. 38.5 per cent contained cues for personal achievement motivation. Thirty-one of them (16.15 per cent) contained cues for social achievement motivation and 41 (21.35 per cent) of them contained cues for influence motivation. The remaining stories contained cues for more than one motive, for instance, 12 stories had both personal achievement motivation and influence motivational cues, 18 stories had social achievement and influence motivational cues and 16 stories had personal achievement and social achievement motivational cues. Interestingly, there was no story, which contained all the three motivational cues. The data further show that apart from 74 stories, which had personal achievement motivational cue only, there were 28 (12+16) other stories, which contained personal achievement motivational cues along with other motives. Hence, there were 102 out of 192 stories (53 per cent), which had personal achievement motivation cues. Personal achievement appears to be the most dominant motive of the respondents, followed by influence motive, which was reflected in 71 (41+12+18) stories (37 per cent). Social achievement acquired the third position with only 65 (31+18+16) stories (34 per cent).

A perusal of data obtained from the two groups of respondents suggests that they do not follow the same trend so far distribution of the stories along various motives are concerned. The data were, therefore, reset as reported in Table 2.

In case of respondents from less successful

Table 1: Motivational profile of the villagers

Nature of Motivation	Successful villages (N=51)	Less Successful Villages (N=45)	Total Respondents (N=96)
PAI	31.6*	48.72	38.5
	36	38	74
	17.6**	21.2	19.3
SAI	18.4	12.8	16.2
	21	10	31
	10.3	5.6	8.1
Influence	21.9	20.5	21.4
	25	16	41
	12.3	8.9	10.7
PA+ Inf	8.8	2.3	6.3
	10	2	12
	4.9	1.1	3.1
SA+ Inf	10.5	7.7	9.7
	12	6	18
	5.9	3.3	4.7
PA+ SA	8.8	7.7	8.3
	10	6	16
	4.9	3.3	4.2
PA+SA +Inf	0	0	0
All Stories	114(56)**	78(43)**	192(50)**
UI stories	90(44)	102(57)	192(50)
Total stories	204(53)	180(47)	384(100)

The figures in the middle column are the frequencies.

*Percentage of the stories containing motivational cues

**Percentage of total stories

Table 2. Distribution of stories containing motivational cues

Need Categories	Successful villages (N=51) No. of stories=204	Less Successful Villages (N=45) No. of stories=180	Total stories of all respondents (N=96) No. of stories=384
Personal achievement	56(27.5) 36*	46(25.6) 38	102(26.6) 74
Social achievement	43(21) 21	22(12.2) 10	65(16.9) 31
Influence	22	12	34

percentage. It may be further added that the fantasies produced by the respondents of successful village (SV) group were on an average richer than the fantasies produced by the less successful village (LSV) respondents. This is evident from the data reported in the Table 2, that a greater number of stories produced by the SV group of respondents contained imageries for more than one motive (20, 22, 22 as against 8, 12, 8).

Personal achievement motivation

As mentioned earlier, the stories were scored for the three motives under study following the scoring procedure developed by Mehta (1976). It may be mentioned here that the stories, which contained cues for more than one motive, were scored separately for both the motives. The total data for this motive, therefore, came from stories containing only personal achievement motivational cues and from the stories, which contained this cue along with some other motive. The achievement motivation scores obtained by the two groups of respondents are reported in Table 3.

The mean personal achievement motivation score obtained by the two groups of respondents found to be significantly different from each other ($t = -0.94$, NS) indicating thereby that the successful village respondents were not superior to the other group of respondents in this respect. The obtained score of four is quite low in view of the total obtainable score of 36 by one respondent. Thus the achievement motivation level of the respondents is obviously very low. If we look at the sub categories of score obtained by respondents, reason for such lower achievement motivation score becomes clear which is discussed at a later stage in this Section (Table 3).

Social achievement motivation

The data for social achievement motive, as mentioned earlier, came from stories exclusively containing cues of social achievement motive plus the stories, which contained cues for this motive along with some other motives.

The mean social achievement motivation score obtained by the two groups of respondents (reported at the top of Table 4) was found to be significantly different from each other ($t = 2.26$, $p \leq .05$) indicating thereby that the successful village respondents were superior to the other groups of respondents in this respect. Successful management of an integrated watershed entails that the beneficiaries or the participants work in cooperation and participate in the community goals of the watershed. This

Table 3. Personal achievement motivation level

Personal achievement motivation level	Successful villages (N=51)	Less Successful Villages (N=45)	Total Respondents (N=96)
Mean score	4.196	4.733	4.447
SD	2.676	2.911	2.786
Range	0-10	0-11	0-11
t value		-0.94 ^{NS}	
Category			
Low (<Mean-1SD)	9(17.65)	6(13.33)	15(15.62)
Medium (Mean±1SD)	31(60.78)	33(73.33)	71(73.96)
High (>Mean+1SD)	11(21.57)	6(13.33)	10(10.42)

Table 4. Social achievement motivation level

Social achievement motivation level	Successful villages (N=51)	Less Successful Villages (N=45)	Total Respondents (N=96)
Mean score	2.549	1.422	1.989
SD	2.700	2.105	2.498
Range	0-12	0-8	0-12
t value		2.26 ($P \leq .05$)	
Category			
Low (<Mean-1SD)	19(37.25)	28(62.22)	47(48.96)
Medium (Mean±1SD)	25(49.02)	11(24.44)	36(37.50)
High (>Mean+1SD)	7(13.73)	6(13.33)	13(13.54)

might have generated and strengthened their need for social achievement.

Influence motivation

In the case of influence motive, as mentioned earlier, all the stories exclusively containing cues for social achievement motive plus the stories which contained cues also for some motives were tabulated and reported in Table 5.

The mean influence motivation score obtained by two groups of respondents (reported at the top of table 5) was not found to be significantly different from each other ($t = 2.02$, NS) indicating thereby that the successful village respondents were not different from other group of respondents in this respect. From the distribution

pattern of the influence motivation score of the two groups of respondents, it is clear that the stories narrated by the LSV respondents were more skewed towards lower extreme of the scores (51 per cent as against 29 per cent).

Sub category scores

An examination of the sub-category scores obtained by them helps in understanding the motivational profile of the respondents. Hence, the data were reset to portray the sub-category scores as reported in Table 6.

Personal achievement motivation

If we look at the sub categories of score obtained by respondents, reason for the lower achievement

Table 5. Influence motivation level

Influence motivation level	Successful villages (N=51)	Less Successful Villages (N=45)	Total Respondents (N=96)
Mean score	2.94	1.91	2.86
SD	2.67	2.28	2.498
Range	0-11	0-7	0-11
t value		2.02 ^{NS}	
Category			
Low (<Mean-1SD)	15(29.41)	23(51.11)	38(39.58)
Medium (Mean±1SD)	27(52.94)	14(31.11)	43(44.79)
High (>Mean+1SD)	9(17.65)	8(17.78)	15(15.63)

Table 6. Dimensions of sub-categories of motivation imagery (MI) stories of all the villagers

Sub-categories	Successful villages			Total	Less Successful Villages (N=51)			Total (N=96)	
	PAI	SAI	Inf		PAI	SAI	Inf		
MI stories	56	43	47	146	46	22	24	92	238
Personal action	55	19	19	93	40	11	10	71	164
Social action	7	24	22	53	5	12	23	40	95
Anticipated action	1	2	1	4	3	0	0	3	7
Strength	5	2	1	8	4	1	0	5	13
Hope	3	1	2	6	1	0	1	2	8
Personal and social awareness	16	18	6	40	11	9	7	27	67
Vigilance	2	0	1	3	4	1	0	5	8
Thema	36	21	25	82	38	10	16	64	146

motivation score becomes clear. Most of the respondents could not verbalize the sub-components like vigilance, anticipated action, hope, strength, etc. This clearly implies that the respondents were weak in their associative networks of motivational imagery. This calls for renewed efforts for training for heightening their achievement motivational level. Efforts need be made to make them conscious about possible dangers of failure (vigilance), awareness of their personal and social blocks and their strengths and hope of success, etc.

Social achievement motivation

As mentioned earlier, most of the respondents could not verbalize the sub-components like anticipated action, vigilance, hope, strength, etc. This clearly implies for heightening their achievement motivational level. Efforts need be made to make them conscious about possible dangers of failure (vigilance).

Influence motivation

Even in this motivation, the above-mentioned sub-components are either missing or very weak. Efforts need be made to strengthen them through suitably designed training programmes.

CONCLUSION

The study revealed that personal achievement motivation and influence motivation of the two groups of respondents were more or less the same, but the social achievement motivation of the respondents from successful villages was higher than those from less successful villages. Further levels of the motives was

quite low since most of the respondents were not conscious of the components of motive like strength, apte, vigilance, anticipated action, etc.

This provides two important insights: a) the nature of activities being carried out in the project is such that community participation becomes imperative. Indulgence in such activities by the villagers (as evidenced in case of SV group of villages) promotes their concern for social well-being and achievement. b) to improve villager's motive through a planned intervention, designed efforts need to be made.

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Content Analysis of Livestock Related Broadcast Programmes of All India Radio

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ABSTRACT

A content analysis of livestock programmes of All India Radio, Bareilly, namely *Kheti Kisani* and *Kisan Vaani* was done. The analysis revealed that in both the programmes the entertainment was given more priority. The livestock programme was given lesser importance in terms of frequency and time devoted. Both of the programmes were found having good audio quality and majority of the items were timely and relevant. The speed of the presentation was not proper in majority of formats of both programmes. In *Kheti Kisani* programme majority of the items were easily understandable while in *Kisan Vaani* programme, majority of items were moderately understandable to the farmers.

India has the largest livestock population in the world which is more than 484.9 million during the year 2003 and has a production of 88.1 million tonnes of milk during 2003-2004. India has already achieved the status of highest milk producing country in the world, but considering the number of cattle and livestock farmers involved in it the performance is not so much satisfactory. Researches have proved that one of the main reasons for low productivity of our animals is lack of knowledge and awareness about recommended practices among livestock owners. Radio is one of the mass media that has ability to spread the required information in cheaper and quicker manner. The All India Radio has played a significant role in bringing the new technology in agriculture and livestock to the doors of farmers. Almost all the radio stations are broadcasting programmes related to agriculture and allied fields. Keeping in view the growing importance of livestock in raising income of rural poor and its contribution to national income there was urgent need to know about the amount of livestock information coverage in these radio programmes. Therefore the present study was undertaken

to have a content analysis of the livestock related programmes being broadcast by All India Radio, Bareilly, namely *Kheti Kisani* and *Kisan Vaani*.

METHODOLOGY

The technical programme of the present study was considered of content analysis of programme on livestock information broadcast by All India Radio, Bareilly namely *Kheti Kisani* and *Kisan Vaani*. A total of 10 episodes of *Kheti Kisani* and *Kisan Vaani* broadcast from 01.01.2005 to 28.02.05 formed the universe of content. The data were collected by recording both programmes during the above mentioned period. Thereafter the recorded cassettes of *Kheti Kisani* and *Kisan Vaani* were presented before panel of judges to judge its timeliness, relevance, adequacy and audio quality. The rest of the data were analysed by directly listening to the programme and noting down the contents. The content of the programmes was analyzed for type of programme, area of the programme, mode of presentation, speed of presentation, timeliness and relevance of the message, audio quality of the message, treatment of the message.

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adequacy of the content and intention of the message.

RESULTS AND DISCUSSION

Type of the programme

A perusal of data presented in Table 1 reveals that for *Kheti Kisani* programme most of the items (66.4%) were supportive type and only 33.6 per cent items belonged to major type containing livestock and agriculture related topics. Accordingly 65.73 per cent time was devoted for supportive items while only 35.63 per cent, time was devoted for major topics.

A perusal of data presented in Table 2 reveals that for *Kisan Vaani* programme also majority of the items were supportive type (74.59) while only 25.4 per cent items were related to major type. Accordingly most of the time (74.09%) was devoted to supportive type and only 25.83 per cent time was devoted to major type. Among major topics only 9.8 per cent items were from livestock and related areas with 9.3 per cent time devoted while majority of the items (15.57%) were from agriculture and related topics with 16.60 per cent of time devoted.

Area wise distribution of the programmes

Table 3 shows the areawise distribution of all the items broadcast in *Kheti Kisani* programme. The table reveals that among livestock and related information green fodder for animals topic was covered (5.61%) followed by poultry topic (1.6%). Accordingly more time (46.7%) was allocated to green fodder for animal. Among agriculture related items maximum number of items (4.8%) were from agricultural equipment topic and accordingly more time (5.18%) was allocated to this topic. Among rural development area greater emphasis was given on various ongoing rural development schemes (10.4%), and maximum time (18.52%) was devoted to this topic. From personal health and hygiene only one item was broadcasted. *Lok geet* was prime item for entertainment with maximum (44.8%) frequency and accordingly maximum (31.45%) time was allocated for this item.

The data in Table 4 show the areawise distribution of all the items broadcast in *Kisan Vaani* programme. The Table reveals that among livestock and related information maximum number of items were based on health and hygiene of the animals (3.27%) while maximum time was devoted on milk production and milk cooperatives (2.77%). Disease prevention and fishery were given least importance. Among agriculture and

Table 1. Type wise distribution of *Kheti Kisani* programme (1st Jan 2005 to 28 Feb, 2005)

Sl No.	Type of programme	Frequency of item n=125	% of item	Duration of item min:sec	Percentage of time devoted
1. Major					
a.	Livestock and related topics	9	7.2	36:45	6.37
b.	Agriculture and related topics	33	26.4	168:30	29.25
Total		42	33.6	206:12	35.63
2. Supporting					
a.	Rural development	16	12.8	125:11	21.75
b.	Health and Hygiene	1	0.8	1:52	0.32
c.	Entertainment	33	52.8	243:46	42.31
Total		83	66.4	370:49	65.73
Grand Total		125	100	576:3	100

Table 2. Type wise distribution of *Kheti Vaani* programme (1st Jan 2005 to 28 Feb, 2005)

Sl No.	Type of programme	Frequency of item n=125	% of item	Duration of item min:sec	Percentage of time devoted
1. Major					
a.	Livestock and related topics	12	9.8	96:51	9.3
b.	Agriculture and related topics	19	15.57	172:48	16.60
Total		31	25.4	269:39	25.83
2. Supporting					
a.	Rural development	8	6.55	99:13	9.53
b.	Personal Health and Sanitation	15	12.29	189:16	18.18
c.	Entertainment	60	49.18	417:16	40.08
d.	Others	8	6.55	65:30	6.29
Total		91	74.59	771:15	74.09
Grand Total		122	100	1040:4	100

related information fruits and vegetable cropping was given maximum emphasis with maximum number of items (5.73%) and time devoted (6.7%). Among rural development programmes maximum emphasis was given on various ongoing rural development schemes.

Mode of presentation of the programmes

Table 5 shows the different farmers of *Kheti Kisar*

Table 3. Areawise distribution of *Kheti kisan* programme (1st Jan 2005 to 28 Feb, 2005)

Sl No.	Type of programme	Frequency of item n=125	% of item	Duration of item min:sec	Percentage of time devoted
1. Livestock related information					
a.	Green fodder for animals	7	5.6	26:55	4.67
b.	Poultry	2	1.6	9:51	1.7
	Total	9	7.2	36.45	6.37
2. Agriculture					
a.	Biological insecticide	5	4	31:27	5.45
b.	Classification of Agriculture products	1	0.8	5:36	2.76
c.	IPM/pesticides	5	4	24:45	4.29
d.	Mashroom Production	3	2.4	15:57	2.76
e.	Biological fertilizer	5	4	25:41	4.45
f.	Drip irrigation technology	1	0.8	4:00	0.69
g.	Ag. equipment	6	4.8	29:51	5.18
h.	Collateral Agriculture	2	1.6	8:11	1.42
i.	Mango production	1	0.8	5:00	0.86
j.	Tree plantation	1	0.8	4:54	0.85
k.	Gair arthik upadan	1	0.8	4:54	0.85
l.	Potato cropping	2	1.6	8:14	1.42
	Total	33	26.4	168:30	29.19
3. Rural development					
a.	RD Schemes	13	10.4	106:51	18.52
b.	SHG self help groups	1	0.8	7:14	1.25
c.	Panchayat raj sabha	2	1.6	11:6	1.92
	Total	16	12.8	125:11	21.72
4. Healths hygiene					
		1	0.8	1:52	0.32
5. Entertainment					
a.	Lok Geet	56	44.8	181:12	31.45
b.	Bhajan	2	1.6	6:38	1.15
c.	Natak	4	3.2	26:42	4.63
d.	Story	4	3.2	29:15	4.07
	Total	66	52.8	243:46	42.3
Grand Total		125	100	576:3	100

and *Kisan Vaani* broadcast. The Table reveals that in *Kheti Kisan* broadcast majority of the items were in the form of introductory part (28.29%). All though frequency for the introductory part was highest, maximum time was devoted to straight talk (39.82%). Interview mode was used least (0.48%) in *kheti kisan* programme.

In case of *Kisan Vaani* broadcast majority of items were in the form of introductory part (20.5%) but

Table 4. Areawise distribution of *Kheti vaani* programme (1st Jan 2005 to 28 Feb, 2005)

Sl No.	Type of programme	Frequency of item n=125	% of item	Duration of item min:sec	Percentage of time devoted
1. Livestock related information					
a.	Milk product & milk cooperatives	2	1.63	28:51	2.77
b.	Health & hygiene	4	3.27	11:26	1.09
c.	Disease and prevention	1	0.81	13:37	1.30
d.	Animal Nutrition	2	1.63	17:33	1.68
e.	Fishery	1	0.81	8:49	0.84
f.	Poultry	2	1.63	16:35	1.59
	Total	12	9.83	96:51	9.23
2. Agriculture and related information					
a.	Wheat irrigation	1	0.81	5:24	0.51
b.	Plant protection/ pest control	4	3.27	34:18	3.29
c.	Medicinal plant	1	0.81	4:57	0.47
d.	Micronutrient	2	1.63	25:48	2.47
e.	Plant growth	3	2.45	30:17	2.9
f.	Fruit & Vegetable cropping	7	5.73	69:45	6.7
g.	Apiculture (Bee keeping)	1	0.81	2:19	0.22
	Total	19	15.57	99:13	16.00
3. Rural development					
a.	Development schemes	6	4.91	65:13	6.26
b.	Potable drinking water	2	1.63	34:00	3.26
	Total	8	6.55	99:13	9.53
4. Entertainment					
a.	Lok geet	52	42.62	359:40	34.55
b.	Natak	6	4.91	48:52	4.69
c.	Des gan (partiotic songs)	2	1.63	8:45	0.84
	Total	60	49.18	417:16	40.08
5. Personal health & sanitation					
		15	12.29	189:16	18.11
6. Others					
		8	6.55	65:30	6.29
Total		122	100	1040:54	100

maximum duration was spent on entertainment (24.01%). Next to entertainment maximum duration was spent on interview mode (21.72%).

Speed of presentation

The speed of the speech should be within the desired limit (which is 125-150 words/minute, Berko *et al.* 1977) to make the content of the message more

Table 5. Different formate of *Kheti Kisani* and *Kisan Vaani* broadcast

Sl. No.	Formate	Kheti kisani		Kisan vaani	
		Frequ-ency	Duration	Frequ-ency	Duration
1.	Introductory part	58 (28.29)	36:33 (6.61)	57 (20.5)	37:36 (2.46)
2.	Straight talk	54 (26.34)	220:11 (29.82)	29 (10.43)	159:28 (10.44)
3.	Discussion	4 (1.95)	8:20 (1.59)	27 (7.91)	120:18 (7.87)
4.	Interview	1 (0.48)	1:16 (0.22)	27 (9.71)	331:41 (21.72)
5.	Question for audience	11 (5.36)	11:5 (2)	30 (10.79)	189:48 (12.43)
6.	Entertainment	57 (27.80)	187:16 (33.87)	54 (19.42)	336:38 (24.01)
7.	Natake/Drama	10 (4.87)	64:19 (11.63)	8 (2.87)	61:58 (4.05)
8.	Advertisement	10 (4.87)	23:47 (4.3)	51 (18.34)	259:13 (16.97)
Grand total		205 (100)	552:47 (100)	278 (100)	1526:39 (100)

* Figures in the parenthesis indicate percentage.

Table 6. Speed of speech in differet formate uder *Kheti Kisani* and *Kisan Vaani* programme

Sl. No.	Formate	Kheti kisani		Kisan vaani	
		Speed (min:sec)	Average (words /min)	Speed (min:sec)	Average (words/ min)
1.	Introductory part	144-170	160	140-170	159
2.	Straight talk	141-170	154	141-170	155
3.	Question for audience	153-182	167	150-182	164
4.	Natak/Drama	135-177	154	115-158	139
5.	Interview	-	-	142-174	158
6.	Discussion	-	-	147-174	163
Grand total		135-182	158	115-182	156

understandable. The study showed that speed of speech in all the formates was higher than the recommended level (Table 6).

Timeliness and relevance of the message

It is evident from Table 7 that all the nine livestock related episodes from *Kheti Kisani* broadcast were timely and from *kisan vaani* broadcast 91.66 per cent programmes were timely and only 8.33 per cent items were not timely. The Table also shows the relevance of

Table 7. Timeline as and relevance of the livestock related messages of *Kheti Kisani* and *Kisan Vaani* programmes

Livestock messages	Timeliness of message		Relevance of message			Total frequency of items
	Timely	Not timely	Highly relevant	Relevant	Irrelevant	
Kheti Kisani						
1. Green fodder for animals	7 (100)	-	-	7 (100)	-	7
2. Poultry	2 (100)	-	2 (100)	-	-	2
Total	9 (100)	-	2 (22.22)	7 (77.77)	-	9
Kisan vaani						
1. Milk production	2 (100)	-	-	2 (100)	-	2
2. Health and hygiene	4 (100)	-	3 (75)	1 (25)	-	4
3. Disease and prevention	1 (100)	-	-	1 (100)	-	1
4. Animal nutrition	2 (100)	-	-	2 (100)	-	2
5. Fisbery	-	1 (100)	-	1 (100)	-	1
6. Poultry	2 (100)	-	-	2 (100)	-	2
Total	11 (91.66)	1 (8.33)	3 (25)	9 (75)	-	12

* Figures in the parenthesis indicate percentage.

the programmes. It is evident from the Table that none of the items were found irrelevant from *kheti kisan* and *kisan vaani* broadcast.

Audio quality of the messages

It is evident from Table 8 that most of the items from *Kheti Kisan* and *Kisan Vaani* were having good audio quality and none of the items was having poor audio quality.

From *Kheti Kisan* broadcast 66.66 per cent items were having good and 33.33 per cent items were having fair audio quality. From *Kisan Vaani* broadcast 83.33 per cent items were having good audio quality and 16.66 per cent items were having fair audio quality.

Table 8: Audio quality of livestock related messages in 'Kheti Kisan and Kisan Vaani' broadcast (1st January 2005 to 28th February 2005)

Sl. No.	Livestock messages	Frequency of items			Total
		Good	Fair	Poor	
Kheti kisan					
1.	Green fodder for animals	5 (71.42)	2 (28.57)	-	7
2.	Poultry	1 (50)	1 (50)	-	2
	Total	6 (66.66)	3 (33.33)	-	9
Kisan vaani					
1.	Milk production	1 (50)	1 (50)	-	2
2.	Health and hygiene	3 (75)	1 (25)	-	2
3.	Disease and prevention	1	-	-	1
4.	Animal nutrition	2 (100)	-	-	2
5.	Fishery	1 (100)	-	-	1
6.	Poultry	2 (100)	-	-	2
	Total	10 (83.33)	2 (16.66)	-	12

*Figures in the parenthesis indicate percentage.

Treatment of the message

The study showed that in *Kheti Kisan* broadcast 55.55 per cent items were having less technical words and 55.55 per cent items were having partial technical words and none of the items were having high technical words. In contrary to this in *kisan vaani* broadcast most of the items (58.33%) were having partial technical words followed by 33.33 per cent items having less technical words and one item (8.33%) was found having high technical words.

CONCLUSION

From the above findings, it can be concluded that in both the programmes i.e. *Kheti Kisan* and *Kisan Vaani* entertainment was given more priority than the agriculture/livestock related items. Among major programmes livestock was given lesser importance in terms of frequency and time devoted. Further the duration spent on livestock related information was also less than agriculture and other programmes. Both of the programmes were found having good audio quality and majority of the items were timely and relevant. Speed of presentation was not proper in majority of formats of both programmes. In *Kheti Kisan* programme majority of the items were easily understandable while in *Kisan Vaani* programme majority of items were moderately understandable to farmers. All the content in *Kheti Kisan* broadcast was found adequate while in *Kisan Vaani* broadcast half of the items were having adequate contents and other half number of items were having somewhat adequate content. Most of the items in *Kheti Kisan* and *kisan vaani* broadcast were intended towards enhancing knowledge only.

Results of the study indicate that in both the programmes livestock was given less priority. Therefore it is needed to increase the duration of livestock related items. Further speed of presentation of both the programmes need to be improved so that audience can understand the contents of the programme, easily.

Factors of Successful Rural Entrepreneurship

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ABSTRACT

Rural entrepreneurship is required to capitalize on the opportunities available and to create job, mainly for rural youths and women. Underemployment and disguised unemployment are driving the rural youth to migrate to urban areas in search of livelihood options. Institutions like Krishi Vigyan Kendras (KVKs) can develop rural entrepreneurship through their capacity building activities like training, consultancy, forward and backward linkages and to some extent by making available the much required inputs in the initial stages. This study identifies the causes and motivating factors for choosing entrepreneurial activity by rural entrepreneurs promoted by KVKs. Analyzing the responses given by 142 entrepreneurs in rural areas, the study has delineated the situational, personal and socio-economic factors that have a bearing on the rural entrepreneurship. Factors that contributed for sustainability of rural entrepreneurship have also been assessed.

Entrepreneurship is a force that mobilizes other resources to meet unmet market demands and it is the ability to create and build something from practically nothing, the process of creating value by pulling together any package of resources to exploit an opportunity. Rural entrepreneurship is required to capitalize on the opportunities available and to create job, mainly for rural youths and women. Entrepreneurship is not uniformly distributed around the world, and the global level of entrepreneurship has changed in recent years. Individuals' entrepreneurial capacity can be enhanced by good education systems. But Indian education system is rated below average in imparting entrepreneurial skills. India ranks 127th out of 173 countries ranked for Human Development Index (Human Development Report, 2003).

The experts stress the need for providing vocational training programmes for creating entrepreneurial attitudes in the young minds. Unlike Germany, vocational education has not succeeded in India.

In India, Krishi Vigyan Kendras (KVKs) provide vocational education, by training rural youths, farmers and farm women to take up income generating activities. While reviewing and analyzing the rural entrepreneurship, Hansra *et al.* (2002) choose the definition of an entrepreneur as person who either creates new combinations of production factors such as new methods of production, new products, new markets, find new sources of supply and new organizational forms; or as person who is willing to take risks; or a person who by exploiting market opportunities eliminates disequilibria between aggregate supply and aggregate demand; or as one who own and operates business.

The present study was envisaged to assess rural entrepreneurship with the following specific objectives:

- (i) To find out the causes and motivators of rural entrepreneurship promoted by the KVKs in rural areas.

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- (ii) To study the management pattern of rural enterprises in terms of its inflow-outflow analysis, economics and the socio-economic impact of the rural entrepreneurship among the beneficiaries.
- (iii) To delineate the factors attributed by the entrepreneurship as responsible for sustainable management of their enterprises.

METHODOLOGY

A total of 142 entrepreneurs constituted the sample of respondents for the study, which comprised of 28 entrepreneurs from Karnataka, 75 from Tamil Nadu, 32 from Kerala and seven from Pondicherry. These were the entrepreneurs promoted by KVKs spread over 30 districts - seven each of Karnataka and Kerala, 15 districts of Tamil Nadu, and one from Pondicherry.

Using a structured interview schedule developed and standardized by the researchers, the researchers collected details during 2003-04. The data have been analyzed by using frequency, percentage and ranks.

Motivation index was measured by using the following formula :

$$\text{Motivation Index} = \frac{\text{Total rank value}}{\text{No. of entrepreneurs in each enterprise} \times \text{max. rank value (11)}} \times 100$$

RESULTS AND DISCUSSION

Motivating factors for choice of enterprises in rural areas

Seven factors were identified as the motivators for selection of enterprises (Table 1). Training given by KVKs was the most important motivating factor to start the enterprises. This is obvious as all these entrepreneurs were the trainees of KVKs either before starting the enterprises or at different stages of the enterprise. Earning a source of livelihood was the next major reason for starting the enterprises with a motivation index value of 74.5. That means, the opportunity-based (KVK-facilitated) entrepreneurship and the necessity-based (urge to earn a livelihood) entrepreneurship were equally significant in rural areas. Sericulture and fishery enterprises were found to be attractive for rural youth for the subsidies and other material benefits that are offered through the Government schemes. Hobbies turning into full pledged enterprises were evident in case of nursery enterprises among men, and tailoring enterprises among

Table 1. Motivating Factors for choice of Enterprises

Rank	Motivating factors	Motivation index value
I	Influence of KVK training	85.9
II	As a source of livelihood	74.5
III	Hobby developed into entrepreneurship	34.2
IV	Influence of a successful entrepreneur in the locality	31.6
V	Local availability of inputs	26.6
VI	To use Government schemes	15.9
VII	Inherited from parents	6.2

women. Influence of successful entrepreneurs and the availability of required raw material for the enterprises have also emerged as the motivators for rural entrepreneurship.

Rural areas of the country are abounding with opportunities for rural entrepreneurship, but to convert the opportunities into livelihood options, institutions like KVKs are required in each district.

The situational and personal factors

Most of the enterprises were located near to approach roads. Except sericulture enterprises, most other enterprises were located near to main roads also. Probably, the interior location of the rearing houses is preferred by the sericulturists to maintain disease free rearing conditions. Also as the silk cocoons are in weight, distance to road may not create problems in transportation. Moreover, the major input being the mulberry, the crop is cultivated near the rearing shed itself, so that the interior location of enterprises did not matter much.

On the contrary, nurseries must be located on the roadside to facilitate marketing and transportation. It is also required to bring in inputs like compost, red earth and sand which are bulky as well difficult to transport. Nursery products like grafts and planting material are difficult to handle, if they have to be carried too long. Hence it was mandatory for nurseries to be located on the road sides. Veterinary services like para-technicians are located farthest from the district headquarters. The success of veterinary services has been phenomenal in interior areas where the services of Department of Animal Husbandry have not reached. This is the reason, why most entrepreneurs in this field choose to work in interior areas.

Different enterprises attracted an average investment of Rs. 1.2 lakh. The highest investment was

Table 2. Personal and situational details of entrepreneurs practicing different enterprises

Enterprises	Age of the entrepreneur (years)	Education (Years)	Distance to the service road	Distance to main road	Distance to District HQ.	Total investment made for the enterprise (Rs. lakhs)
Crop production	42.9	11.9	0.2	3.1	35.5	1.88
Fishery	42.3	10.6	0.4	6.1	19.4	0.53
Animal husbandry	40.3	11.7	0.2	3.2	29.4	1.99
Mushroom production	32.9	12.4	0.2	2.3	37.2	0.43
Nursery	32.5	12.8	0	0.7	32.1	4.19
Seed production	45.2	12.4	0.2	2.3	30.4	0.65
Sericulture	46.3	5.5	1.5	12.9	52.5	2.31
Small scale industries	40.1	10.6	0.6	4.2	33.9	0.84
Tailoring	35.5	9.7	0.4	4.8	30.2	0.13
Vermiculture	37.5	10.1	0.2	3.3	47.2	0.45
Veterinary services	35.0	10.0	0	6.0	68.3	0.22
Overall	39.8	11.5	0.4	3.7	35.1	1.2

Table 3. Differences between men and women entrepreneurs

Particulars	Men (n=80)	Women (n=62)	Overall (n=142)
Family size (No.)	4.3	4.0	4.1
Age (Years)	40.9	37.7	39.8
Education (Years of schooling)	11.7	10.3	11.5
Time spent (%)	68.0	58.7	63.9
Distance to road (km)	0.32	0.48	0.39
Distance to main road (km)	3.50	3.90	3.68
Distance to district HQ (km)	44.58	34.21	40.05
Age of the enterprise (Years)	5	4	4.3
Total investment (Rs. lakhs)	1.73	0.62	1.24
Current net worth of assets (Rs. lakhs)	3.09	0.70	2.06
Preferred distance to procure inputs (km)	29.56	20.25	25.49
Preferred market facility distance (km)	20.05	6.44	14.07
Loan (Rs. lakhs)	2.00	0.63	1.07
Duration of loan (months)	46	28	39
Interest on the loan (%)	14.0	15.6	14.6
Average value of inputs used (Rs.)	117804	119749	118654
Average income (Rs.)	303306	216436	265376
B:C Ratio	3.13	2.65	2.92

Table 4. Socio economic profile of the high and low productive entrepreneurs

Socio-economic factors	Low productive group	High productive group	Overall
Family size (no.)	4	4.5	4.1
Age (years)	39.11	40.38	39.5
Education (years)	10.69	12.09	11.1
% time spent	62.46	67.41	63.9
Distance to road (km)	0.46	0.27	0.39
Distance to main road (km)	3.60	3.81	3.68
Distance to district HQ (km)	31.09	56.04	40.1
Age of the enterprise	4.1	4.9	4.3
Investment (Rs. lakhs)	1.18	1.35	1.2
Current net worth (Rs. lakhs)	1.68	2.71	2.1
Preferred raw material availability distance (km)	21.16	33.23	25.5
Preferred market distance (km)	14.16	13.89	14.1
Loan amount (Rs.)	54100	98215	67149
Duration of loan (months)	36	46	39
Interest (% per year)	14.6	14.6	14.6
Information use index	70.0	79.6	72.8
Information source (no.)	5.8	6.9	6.1
Input cost (Rs.)	148598	65224	114426
Total income (Rs.)	238923	312577	273768
B.C. Ratio	1.80	4.91	2.92

noticed among nursery entrepreneurs as compared to the least investment in case of tailoring (0.13 lakh) and veterinary services (0.22 lakh). The least investment option available with tailoring is one of the reasons for majority women to take up these enterprises.

Investment made by men entrepreneurs was significantly higher than the women entrepreneurs and as a result had higher returns (3.09 lakh) as compared to women (Rs. 0.70 lakh). Women preferred local markets. Men borrowed larger amount of loan with larger repayment period and less interest rates and were able to generate more income although the amount spent on inputs was almost same by both men and women. Hence the men entrepreneurs derived higher B:C value (3.13) as compared to women entrepreneurs (2.65).

Socio-economic factors and the economics of rural enterprises

Entrepreneurs belonging to the high-productive group (above average B:C ratio) had slightly larger families, better educated, older in age and spent more time in their enterprises as compared to low productive (below average B:C ratio) entrepreneurs. High productivity achievers were located nearer to approach road even though such places are little away from the district HQ. Slightly higher investment has resulted in better B:C ratio and thereby greater net worth of assets (Table 4). Information use efficiency and the number of information sources used were better among this group. In addition to these parameters, they achieved higher B:C ratio, by managing low cost of production and realizing higher gross income.

Factors contributing to sustainability of rural entrepreneurship

Eight factors have been identified as essential for sustainable management of rural enterprises. Economic benefits and the personal interest in the enterprise were the two most important factors that propelled the entrepreneurs to sustain their enterprises (Table 5). This corresponds to the information available elsewhere in this report on the motivators to chose the enterprises, wherein it is clearly spelt out that the urge to earn a livelihood was an important motivator to become entrepreneur.

About 74 per cent of the entrepreneurs felt that the market for the produce at a reasonable distance is an important factor for sustainable management of the enterprise. Employment generated out of the enterprise to the entrepreneurs or to their family members was another factor for about 73 per cent of the entrepreneurs.

Table 5. Factors contributing towards sustainability of rural entrepreneurship

Rank	Factors	Percentage of Entrepreneurs
I	Economic benefits (regular income of lump-sum)	83.1
II	Personal interest and capabilities (strengths)	80.9
III	Availability of market for produce within a reasonable distance	73.9
IV	Employment generation to self or to the family members	72.5
V	Availability of raw materials/inputs at easy to access place	67.6
VI	Satisfaction due to increased status in the family or community	65.5
VII	Satisfaction due to challenging nature of the enterprise	58.4
VIII	Dual purpose (home consumption as well marketing) utility of products	36.6

Availability of raw material at easy to access places was also an important factor for sustainable existence and management of rural enterprises. The psychological benefits derived out of the entrepreneurship have also been found to be responsible for successful entrepreneurship in rural areas. It is necessary that the policy makers, entrepreneurship promoters and development agencies take note of the findings while propagating more rural enterprises in rural areas.

CONCLUSION

The training and technical guidance provided by the KVKs has emerged as the most important motivating factor for starting the enterprise. Earning a source of livelihood was the next most significant factor for taking up entrepreneurship. Personal interest, presence of successful entrepreneurs in their neighbourhood and availability of raw material have also been found to be the influential factors for starting rural enterprises. Opportunity based and necessity based entrepreneurship were evident in equal proportion. Even the necessity driven entrepreneurship also needed to be pushed to make the rural youth realize the opportunities available within their surroundings. By making the opportunities visible and within reach to the rural youth, KVKs, with technical back up and input-output linkages have acted as facilitating and catalytic forces for successful rural entrepreneurship.

All the rural enterprises proved to be economically viable as indicated by more than unit B:C ratio. Seed production, vermiculture, mushroom production, fisheries and nursery are being practiced by few entrepreneurs but have proved to be high profit enterprises. The time-tested enterprises like crop and livestock husbandry have also been proved profitable with three times higher returns to the average cost of production. These rural entrepreneurs, in the process of earning a livelihood, have actually contributed for the growth of agriculture in the surroundings by providing the most important inputs like seeds, planting material, organic manures, bio-fertilizers, and above all by serving as models for horizontal spread of technologies. Entrepreneurs belonging to high productivity group had higher education, spent more time in the enterprise and located their firms near to approach roads. Such firms/enterprises were slightly older, had higher investment and have created assets with high net worth.

Sustainable rural entrepreneurship is a product of motivation and technical back up provided by the scientific institutions like Krishi Vigyan Kendra, with forward and backward linkages like finance, raw material and marketing. These could be treated as five essentials for promoting rural entrepreneurship.

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Participation of Beneficiaries in Information Communication Technology (ICT) Projects

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Information Communication Technologies (ICTs) can be used as a powerful method in reaching the unreached in the rural areas. Various forms of ICTs such as multimedia, internet, agriportals, Kissan call centres, interactive video, teleconferencing, video conferencing etc. can be made use of for accelerating the pace of agriculture and rural development. India has already witnessed the success of ICT projects such as Gyandoot project, Warana Wired village project, Information Village project etc. The state of Kerala also has its presence in this IT revolution. Government of Kerala has launched an IT based information system called "Kissan Kerala". The IT mission Kerala, Akshaya - the e-literacy programme, Kissan call centre Friends, Sevana etc. are the major initiatives in this new extension approach. These projects aim at farmer centric integrated distributed information system for agriculture. Projects like Akshaya aims at improving the e-literacy and developing e-readiness among the rural people. An exploratory study was conducted to assess the extent of participation of beneficiaries in two ambitious ICT initiatives by Kerala state namely, Akshaya and Kissan Kerala.

METHODOLOGY

The study was conducted in three districts of Kerala namely, Malappuram, Thrissur and Palakkad. Two Information Communication Technologies that have more relevance to agriculture and rural development namely Kissan Kerala and Akshaya were selected. Forty respondents were selected from each projects making to a total of 80. Simple random sampling method was used

to select the respondents. Data was collected using a well structured and pretested interview schedule.

Extent of participation was operationally defined as the degree of involvement of rural people in various Information Communication Technology (ICT) enabled rural development initiatives. Extent of participation was measured by assessing three dimensions like, degree of participation, reasons for participation and post participation.

The degree of participation in Akshaya project was measured by assessing the respondent's attendance in e-literacy programme. In Kissan Kerala project extent of participation was measured by assessing how often they use Kissan Kerala website*. In both the cases a score 1,2,3 and 4 were assigned according to their degree of participation, making the maximum score that can be attained 4 and minimum 1.

The reasons for participation was measured by giving 4 reasons and the respondents were asked to which reason they attended the programme. A scoring pattern of 1,2,3 and 4 was used. Maximum score that can be attained was 4 and minimum score 1.

Post participation was measured by assessing their continued involvement in the programmes. Respondents were asked to select the services they have used and the number of times they have used in last six months. For each services a score of one was given and it was multiplied with the number of times they have used that particular services and it was added to get their score for

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post participation. The grand total of these three categories namely, degree of participation, reason for participation and post participation was taken as the respondents extent of participation.

RESULTS AND DISCUSSION

Extent of participation of beneficiaries in ICT projects

Extent of participation was calculated by assessing degree of participation, post participation and reasons for participation of beneficiaries in the programmes. The mean scores of Akshaya and Kissan Kerala beneficiaries are presented in Table 1. It can be observed that Akshaya beneficiaries are having a score of 11.38 for participation in ICT project and Kissan Kerala beneficiaries are having a higher score (20.95) for the same.

Mean scores of degree of participation and post participation

The data in Table 2 shows that Akshaya beneficiaries have a higher mean score (3.83) for degree of participation and Kissan Kerala beneficiaries have a mean score of 2.73 for degree of participation. It can also be seen that mean post participation score of Akshaya beneficiaries is 5.15 while Kissan Kerala beneficiaries obtained higher mean score (14.24) for post participation.

The low post participation score of Akshaya beneficiaries may be due to the lack of follow up by the authorities and this is the reason for their low score for extent of participation.

Reasons for participation

The data in Table 3 show that exactly 50 per cent of Akshaya beneficiaries are participating in the programme due to their self interest, 40 per cent for future benefits and 10 per cent of the beneficiaries are participating because their friends and relatives are participating. All the Kissan Kerala beneficiaries (100 per cent) are participating due to their self interest.

Extent of participation of Akshaya beneficiaries

The beneficiaries were categorized into three groups based on mean and standard deviation, viz, low, medium and high. The results are presented in the Table 4.

The study showed (Table 4) that majority (82.5 %) of the respondents had high degree of participation and

Table 1. Extent of participation of Akshaya and Kissan Kerala beneficiaries (N=80)

Beneficiary	Mean participation score
Akshaya	11.38
Kissan Kerala	20.95

Table 2. Mean Scores of degree of participation and post participation (N=80)

Beneficiaries	Mean degree of participation	Mean post participation
Akshaya	3.83	5.15
Kissan Kerala	2.73	14.23

Table 3. Comparison of reasons for participation by the beneficiaries (N=80)

Reason	Akshaya		Kissan Kerala	
	No.	%	No.	%
Because friends and relatives are participating	4	10	0	0
For future benefits	16	40.0	0	0
Because of self interest	20	50.0	40	100.0

Table 4. Extent of participation of Akshaya beneficiaries (N=40)

Indicators	Categories	No.	Per cent
Degree of participation	Low=1	0	0
	Medium=2	7	17.5
	High=3	33	82.5
Post participation	Low (<2.12)	19	47.5
	Medium (2.12-8.18)	12	30.0
	High (≥8.18)	9	22.5
Overall participation	Low (<9.08)	18	45.0
	Medium (9.08-15.67)	13	32.5
	High (≥15.67)	9	22.5

17.5 per cent of the respondents had medium level of participation. It was also observed that none of the participants had low level of participation. In the case of post participation majority of the beneficiaries had low level (47.5%) of post participation followed by 30 per cent having medium post participation and 22.5 per cent having high level of participation. In overall a majority of the beneficiaries (45%) had low participation while 32.5 per cent of the respondents had medium and 22.5 per cent of the respondents had high participation.

Extent of participation of Kissan Kerala beneficiaries

Based on their score of extent of participation of the beneficiaries were categorized in to low, medium and high groups.

The data in Table 5 show that the beneficiaries are distributed equally in all the categories. Almost one third of the respondents had low (30%) participation followed by medium (35%) and high (35%) participation.

From the same Table it is observed that more than half of the respondents (55%) are having high degree of participation followed by 40 per cent in medium level and only five per cent with low level of participation. In the case of post participation almost equal per cent of the beneficiaries had low (30%), medium (32.5%) and high (37.5%) level of post participation.

Table 5. Extent of participation of Kissan Kerala beneficiaries (N=40)

Indicators	Categories	No.	Per cent
Degree of participation	Low=1	2	5.0
	Medium=2	16	40.0
	High=3	22	55.0
Post Participation	Low (<11.5)	12	30.0
	Medium (11.5-46.96)	13	32.5
	High (≥16.96)	15	37.5
Overall Participation	Low (<17.84)	12	30.0
	Medium (17.84-24.01)	14	35.0
	High (≥24.01)	14	35.0

CONCLUSION

The study revealed that Akshaya beneficiaries had more degree of participation and Kissan Kerala beneficiaries had more post participation. It was noticed that there is a lack of follow-up from the part of authorities after implementing Akshaya project. Care should be taken to ensure sustained participation and beneficiaries in the project. Majority of the beneficiaries in both the projects participated due to their self-interest. It projects a huge scope for penetration of ICTs and ICT enabled services to rural people.

Socio-Economic Condition of Fishermen in Andaman Islands

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The fishery potential of Andaman EEZ has been estimated to be around 2.435 lakh metric tones annually and at present only around 28,000 metric tones are (11.40 %) caught. The coastal tunas and oceanic tuna and tuna like fishes are the major components of fishery resources with a total estimate of 1.82 lakh metric tones. The remaining comprises the pelagic fishes like sardines, mackerel, clupeids, carangids, seer fish and sharks and demersal fishes like perches. At present only around 1,200 traditional, non-mechanized boats and 250 motorized boats operate in in-shore and near shore. Only six mechanized vessels operate for trawling. The infrastructure like fish landing centers, boat building yards, minor and major fishing harbours are lacking to facilitate commercial fishing.

In Andamans, fishermen were originally brought from mainland and settled at several localities by the Government by providing financial assistance such as free plots for house construction, fishing materials like net, twine, hook etc. During the days of penal settlement, the Jail authorities in Port Blair had taken responsibility of supplying fish to the public and for this a team of convicts showing an aptitude towards fishing was deputed in the profession of fishing in Andamans (Dam Roy and Dorairaj, 1994).

Fishing as a commercial activity is of a relatively recent origin in Andaman and Nicobar Islands. Fishermen from West Bengal, Andhra Pradesh, Kerala and Tamil Nadu have come to these islands either through settlement scheme of the government or voluntarily. However, at present majority of the marine fishing activities are being carried out by fishermen from Andhra Pradesh (Ahlawat *et al.*, 2001). Fishermen in these islands are invariably

engaged in fish netting also, since the supply from the Department of Fisheries is not sufficient to meet their requirements. Hence, they purchase the raw materials from the market and make net on their own. Any farming or non-farming activity is interdependent with the socio-economic status of the individual. It could be considered both the cause and effect of farming. Fishing is no exception to this relationship. Hence, it was felt imperative to study the socio-economic status of the fishermen in these islands in order to have a holistic approach for the development of them, ultimately leading to the development of these remotely located islands of our country.

METHODOLOGY

In order to study the socio-economic status of fishermen in Andaman and Nicobar Islands, a survey was conducted during January-February, 2004 with the help of structured interview schedules in the fishing villages. Altogether 12 fish landing centers were studied, viz., Durgapur and Kalighat in North Andaman Island, Coral Katcha, Kadamtala, Rangat, Mayabunder, Billiground and Betapur in Middle Andaman Island and Dignabad, Junglighat, Guprapara and Wandoor in South Andaman Island. From the sample fishermen, about 30 from each landing centre were selected by simple random sampling technique and observations on age, literacy, family size, number of members actually employed in fishing in the family, their resources, number of fishing boats owned, total catch per day, their price at the market and at the landing site, etc. were recorded through interview with the fishermen. Some profiles about the socio-economic status of the fishermen were measured with the help of scales developed by Trivedi (1963) and Singh and Sharma (2003)

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with slight modifications. For measuring the other socio-economic indicators, simple average analysis was used and the results were discussed in this paper.

RESULTS AND DISCUSSION

The study revealed that in Andaman, a majority of the fishermen (54.72 %) fell under the age group of 35-45 years, followed by those under the groups, 25-35 years (30.00 %) and 45-55 years (15.28 %). Island-wise perusal also revealed the same pattern. Actually, in North Andaman island, the age of the fishermen ranges from 25-55 years with the average of 42. The corresponding figures for Middle Andaman are 32-60 with the average of 43. Similarly, the fishermen in the South Andaman island are in the range between 24-55 years of 41 years. It could be inferred from the above findings that the productive age of fishermen in Andamans was around 35-45 years.

Based on the preliminary survey conducted earlier, the educational status of the fishermen was classified as illiterate, primary, secondary and collegiate. The demographic pattern of the fishermen population based on literacy level revealed that as much as 41.11 per cent of the fishermen in the islands were illiterates, followed by those educated upto primary level (31.67 %) and secondary level (25.83 %) and a very smaller percentage (1.39 %) of fishermen population had studied upto collegiate level. In the North Andaman island, about 40.00 per cent of the fishermen surveyed are either illiterates or secondary level educated, followed by primary level educated fishermen comprising about 20.00 per cent. In case of Middle Andaman island, the illiterates constitute about 50 per cent of the sample fishermen surveyed, followed by primary (33.00 %) and secondary (17.00 %) level educated. There was no graduate fishermen in both North and Middle Andaman islands. Conversely, in South Andaman island, fishermen were found relatively more educated and highly aware about the profitability of fishing and its related activities. It was also noticed that majority (36.00 %) fishermen studied upto primary level, followed by those (32.00 %) upto secondary level and illiterates (28.00 %) in South Andaman.

Family size

The family size was classified into three categories, viz. small, medium and big based on the number of members in the family. As per the methodology followed, the families, which have less than 5 members were considered small; those having 5-6 members were classified as medium and the families having more than 6 members were considered big. The investigation revealed

that a majority (48.61 %) of the fishermen families in Andamans are of medium category, followed by small (31.94 %) and big (19.45 %). Similar trend was observed in Middle and South Andaman, while there was no small fishermen family in North Andaman.

Number of members actually engaged in fishing

Almost in all the fishermen families, 1-2 persons were found engaged in fishing in marine areas. However, the average figures could be seen from Table 1 for all the three groups of islands, viz. North, Middle and South Andaman.

Number of fishing boats owned

In every fishing village, the situation related to ownership of fishing boats revealed that almost majority families have atleast a boat, either manually operated or motor dependent. About 1 to 4 members use a boat for fishing purpose and they share the catch after each fishing (Table 2).

Nature of house

The fishermen of these islands were found to be living either in hut or in thatched houses. It may be either owned or rented. The types of house they are living are presented in the Table 3.

Total catch/ day

The catch per fishing varies according to the season, whether peak or lean. The peak season in Andamans is between July and September and the rest is the lean season. The average catch/ fishing ranged from 15-50 kg, when country boats were used. On the other hand, when motor boats were used, the catch was found to be ranging from 50-150 kg.

Price of fish

The sale price of fish caught was found to be varying from place to place, i.e. landing site, local market, Port Blair market. The fishermen themselves sell their catch at the landing site every day. The female members of the fishermen family also bring some quantity to local market and sell them with margin ranging from Rupees 10-50/ kg in general depending upon the species. The average sale price/ kg of fish and prawn are shown in Table 7.

CONCLUSION

In order to improve the socio-economic status of the Island fishermen, their participation in the progressive activities for Fisheries development is crucial. In addition

Table 1. Number of family members engaged in fishing

Name of the island	No. of members engaged in fishing	Total family members
North Andaman	1.9±0.29 (37.25)	5.1±0.78
Middle Andaman	1.5±0.14 (27.27)	5.5±0.52
South Andaman	1.4±0.17 (26.42)	5.3±0.64

Figures in parentheses indicate percentages to total number of fishermen

Table 2. Number of family fishing boats owned

Name of the Island	Number of boats
North Andaman	0.7±0.035
Middle Andaman	0.9±0.053
South Andaman	0.9±0.405

Table 3. Type of house possessed by fishermen

Name of the island/village	Nature of house	Type of ownership
North Andaman		
Durgapur Hut	Rented	
Kalighat Thatched	Rented	
Middle Andaman		
Mayabunder	Hut	Rented
Rangat Hut	Rented	
Coral Katcha	Thatched roof, concrete wall	Encroached
Betapur Hut	Owned	
Kadamala Thatched	Rented	
Billiground	Hut	Owned
South Andaman		
Guptapara Katcha, Aluminium sheet roof	Owned	
Wandoor Katcha/ semi-pucca	Owned	
Junglighat Semi-pucca/ concrete	Rented	
Dignabad Tin roof, concrete wall	Rented	

Table 4. Price of fish and prawn at different markets (Rupees/Kg)

Name of the island	Landing site		Local market		Port Blair	
	Fish	Prawn	Fish	Prawn	Fish	Prawn
North Andaman	20-40	60-80	50-60	80-100	-	-
Middle Andaman	10-40	70-80	20-80	100-110	30-90	120-200
South Andaman	20-70	70-80	30-80	100-110	30-120	120-200

The price of fish and prawn varies according to the species in general.

to these, literacy mission activities need to be carried out in efficient manner for fishermen community in these islands in order to be informative about the market trends and also to protect themselves from the unscrupulous practices of middlemen. The living standard of fishermen has to be improved by providing welfare schemes like financial aid/ credit facility to acquire land/ construction of living quarters in colonies near major fish landing centers, co-operative markets at subsidized rates, health/ risk coverage, credit cards similar to kisan cards, common facilities for ice/ fish storage and fish drying, etc. Since most of the fishermen are depending on credits from middlemen for their various activities and requirement,

more financial assistance should be provided to them in the form of subsidy, loan etc. at least in the initial phase of development of these sector in these islands. Andaman & Nicobar administration can provide incentives to the fishermen and the intermediaries associated with the fisheries sector similar to those provided by some of the maritime states of the mainland, India such as the following:

- (i) Supply of fishing inputs at 50 per cent subsidy.
- (ii) Supply of engines on 50 per cent subsidy.
- (iii) Life saving and fire fighting appliances at 50 per cent subsidy.
- (iv) Supply of fishing materials free to the tribes.

- (v) Loan for purchase of plots as well as for construction of house.
- (vi) Subsidy for acquisition of improved craft and gear.
- (vii) Subsidy for deep freezers, insulated vans tricucles etc.

With these measures, the socio economic status of fishermen in these island would definitely bound to improve in the long run.

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Male Migration and Female Headship

Sabita Mishra, Abha Singh, Ashok Baran Das and Hema Pandey¹

Migration is an inherent characteristic of the human development process. Since pre-historic times, human beings have been known to move from one place to another in search of better living conditions. But the migration of men for off-farm employment has been resulted in tremendous increase in women-headed households. It has been said that about one quarter to one half of the rural households around the world is headed by a woman. In most cases, female-headed households are poorer than male ones, because often the woman is barred from access to land, livestock, other property and inputs. In addition, women are not often allowed to participate in projects or communal activities, such as construction of dams, irrigation channels, etc. The effect of male migration on women's control over property and decision-making varies from society to society. Women's status and power increase in cases where the traditional system already accords relatively high status and economic independence to women. Otherwise women can be severely hampered by the absence of a spouse. Ultimately, this leads to the marginalization of female-headed households and lower levels of health and nutrition in the family. Therefore, keeping the view in mind, a study was done with the specific objectives of investigating the socio-economic status of the tribal women in male-migrated families and to identify the problems encountered by females due to male absence

METHODOLOGY

The study was done in Khurda district of Orissa. A total of 60 tribal women were selected randomly from five villages (12 from each) dominated by scheduled tribes. They were interviewed with the help of structured interview schedule and the data were recorded.

RESULTS AND DISCUSSION

The study showed that a majority of respondents was from the age group of 36-40 years, having education up to middle school, belonging to scheduled caste, living with joint family system and earning members up to two in a family. Their major occupation was labour work with some secondary occupations like small shops, as servant in others' houses, digging soil and fishing.

The data in Table 1 reveal that two persons from 73.33 per cent of families had migrated to outside places for work whereas one member from 18.33 per cent of families had migrated but the percentage of three members migration in a family was very less i.e. 8.33 per cent. During interview it was asked about the migration of female and 70 per cent respondents reported that they migrated with their male counterparts while only 30 per cent did not go. The females preferred the nearby places when more work was available with better wage facility.

The tribal women expressed (Table 2) that 50 per cent of the male migrated because of less wage in their locality whereas 35 per cent for no work in local places, 10 per cent for better job and 5 per cent due to over family burden. Majority (55%) of male persons migrated with the advice of Contractors or Sardars while 40 per cent took own decision and very negligible percentage (5%) were motivated because of family members. Regarding the choice of places of migration, most of them (60%) had preferred nearby places followed by preferences as per availability of work (20%) and no fixed places (20%).

Regarding the duration of stay (Table 3) of the migrated persons outside home, it was reported that 70 per cent had no fixed time whereas 25 per cent returned after working for a month and five per cent after fifteen days to visit their homes. The migrated persons had tried

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Table 1. Number of members migrated (N=60)

Number of members	F	%
Male migration		
One	11	18.33
Two	44	73.33
Three	5	8.33
Total	60	100.00
Female migration		
Yes	42	70.00
No	18	30.00
Total	60	100.00

Table 2. Reasons of male migration (N=60)

S. No.	Items	F	%
Reasons			
1.	For beter job	6	10.00
2.	Less local wage	30	50.00
3.	No work at locality	21	35.00
4.	Increase of family burden	3	5.00
	Total	60	100.00
Advisers behind migration			
1.	Family decision	3	5.00
2.	Contractor/Sardar	33	55.00
3.	Self decision	24	40.00
	Total	60	100.00
Place of migration			
1.	As per work availability	12	20.00
2.	No fixed places	12	20.00
3.	Nearby places	36	60.00
	Total	60	100.00

to save money for sending to their family members. The study showed that 48 per cent of them had saved an amount of Rs.500/- to Rs.1000/- and 20 per cent had Rs.1001 to Rs.1500/-.

The male migration resulted in the females taking more responsibility in home management followed by

Table 3. Duration of stay outside (N=60)

S. No.	Duration	F	%
Duration			
1.	No fixed time	42	70.00
2.	Probably one month	15	25.00
3.	Fifteen days	3	5.00
	Total	60	100.00

Table 4. Family care during male absence (N=60)

S. No.	Items	F	%
Persons taking care			
1.	Self	32	53.33
2.	In-laws	20	33.33
3.	Children	8	13.34
	Total	60	100.00
Type of problem			
1.	Management of home affairs	6	10.00
2.	Financial	54	90.00
	Total	60	100.00
Contact persons in case emergency			
1.	Neighbours	38	63.33
2.	Relatives	22	36.66
	Total	60	100.00

paying attention to activities such as wage earning, children's education, cooking, feeding and health care. The study showed that nearly 50 per cent of the women managed their homes independently while there was male migration.

During the period of male absence (Table 4) mostly (53.33%) females took care of the family. Further, the females (90%) faced the financial problem. In case of emergency like ill health, accident etc. about more than the half (63.33%) of the females had sought the help of neighbours and only 33.64 per cent of them depended on their relatives for such problems.

Factors Determining the Extent of Encroachment in Tank Irrigation System

Karpagam D.¹ and C. Karthikeyan²

Since time immemorial, irrigation has been playing a vital role in agriculture as it is indispensable for augmenting farm production. In India, the sources of irrigation are varied viz., rivers, tanks and wells. Now, the area irrigated by tanks had been declining which might be due to encroachment. Encroachment is an unauthorized occupation or use of land/ water, over which a person had no legal rights (Raju *et al.*, 2002). Farmers under the tank command concentrated mainly on ground water irrigation rather than surface irrigation. As a result, due importance was not given for maintaining the feeder channels. This included the farmers who owned land adjacent to feeder channel to encroach it for crop cultivation (Martin and Venkatesan, 1999). Some of the tanks had shrunk as a result of encroachment. The present estimate of loss caused to India as a result of encroachment and other factors was put at Rs.5000 crores. Encroachment of tank was observed in different parts namely supply channel, catchment area, foreshore area, tank bed etc. Encroachment had direct influence over the tank performance. The present study was taken up with the objective of finding out the socio-economic profile of encroachers and to identify the factors that influenced encroachment in tank irrigation system.

METHODOLOGY

This study was conducted in Theni district of Tamil Nadu. Two tank irrigation systems were selected from two taluks namely Bodinayakanur and Periyakulam. To gain better understanding about encroachment in a tank system, entire population i.e. 28 encroachers from Karuvelankulam tank and 20 encroachers from Pappiyampatti tank were selected. Hence all the 48 encroachers comprised the sample for the study. A set of 14 independent variables were studied in this work.

An interview schedule designed for the study was used for the purpose of data collection. Cumulative frequency method was used for categorizing the encroachers as low, medium and high in case of some of the variables.

RESULTS AND DISCUSSION

Profile of the encroachers

The socio-economic profile of the encroachers in the tank system was studied with all the 48 encroachers drawn from two representative tanks of the study area. The study showed that most of the encroachers were aged (46 to 70 years), educated up to secondary level, belonged to medium level of family status and had medium to high level of farming experience (30 to 52 years). Farmers of the head region with farm size of 2 to 8 acres encroached at water spread area, used tank water for irrigating their encroached land, earned medium to high level of annual income (Rs.40,000 to Rs.80,000 per year) and had high level of economic motivation, aspiration and gregariousness.

Extent of encroachment

The distribution of encroachers according to the extent of encroachment of land in a tank system is presented in Table 1.

The encroached land in tank system ranged between 15 and 25 acre. From the findings, it is also known that 64.6 per cent of the encroachers belonged to lower middle (0.5 acre to 1 acre) category in terms of their extent of encroachment followed by 16.7 per cent encroachers under middle level category (1 acre to 1.5 acre). About one-tenth of them were equally distributed to both low (upto 0.5 acre) and upper middle (1.5 acre to

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rank will pave a way for encroaching the tank bed at higher level. Encroachers' basic urge was to earn more money. Generally tank bed soil was fertile compared to other soils. Encroachment in tank bed involved without any initial investment on land and hence induced the encroachers to encroach higher area to earn more money.

Majority of the encroachers belonged to upper caste. And also they had owned land near foreshore area. So they had encroached the tank area for increasing their farm size as much as possible by using their muscle power. Encroachers belonged to lower caste were endless. So they encroached the tank in the water spread area to a lesser extent.

An encroacher with more experience in farming would have more motivation and aspiration to increase his encroached land size. The encroached land was mostly used for agriculture. Agriculture is the primary occupation in the villages studied. Majority of the encroachers were aged, farmers as well as wage earners. Because of these encroachers had high level of farming experience, which led them to extend their encroached land size.

IMPLICATION

Tanks being a common property resource had uniformly suffered from encroachment problem to varying

degrees in the state. Based on the findings of the study, it was understood that a majority of the encroachers were the farmers who possessed their lands around the tank system and extended their lands illegally for cultivation purpose. This act motivated other landless individuals to encroach the tank system. Hence, the Public Works Department/ Panchayat should join with Tank Farmers Association to demarcate the tank boundaries. Strict action must be executed legally against the encroachers by Tank Farmers Association objectively.

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2 acres) category. Only a meagre per cent of them had encroached the land in the tank system to an extent of 2.3 acres. This might be due to the fact that they had 10 acres of land in upper side of the tank. So they encroached maximum land in the foreshore area of the tank compared to his counterparts.

In general, a majority of the encroachers occupied 0.5 to 1.0 acre in the tank system. The reason attributed that more than one-third of the encroachers had own land near foreshore area. Depending upon the farm size and land boundaries only they could encroach the foreshore area of the tank. Moreover the competition prevailed

Table 1. Distribution of encroachers according to their extent of encroachment (N=48)

S.No.	Category	Number	Per cent
1.	Low (up to 0.5 ac)	4	8.3
2.	Lower middle (0.5 ac to 1 ac)	31	64.6
3.	Middle (1 ac to 1.5 ac)	8	16.7
4.	Upper middle (1.5 ac to 2 ac)	4	8.3
5.	High (> 2 ac)	1	2.1
	Total	48	100.0

encroachers had limited them to encroach the tank lesser extent of 1.0 acre to 1.5 acre.

Relationship and influence of encroachers' profile on their extent of encroachment

The relationship and influence of the socio economic characteristics of encroachers on their extent of encroachment was analysed and the results are presented in Table 2.

It is observed from the Table 2 that among the characteristics studied, four characteristics namely farming experience, aspiration and gregariousness were having positive and significant relationship with the extent of encroachment at 5 per cent level of probability and variable economic motivation was found to have positive and significant relationship at 1 per cent level of probability with the extent of encroachment.

The variables caste, farming experience, economic motivation had influenced positively and significantly to the extent of encroachment and hence there are the factors responsible for influencing encroachment in a tank system.

The reasons attributed that higher economic motivation should have created an inner drive to encroach the tank system to a greater extent. Heavy siltation

Table 2. Relationship and influence of the independence variables towards extent of encroachment (N=48)

Variable number	Socio economic profile variables	'r' value	Regression analysis		
			Partial regression coefficient 'b'	Standard error (SEd)	't' value
1.	Age	0.303*	-0.008	0.009	0.36
2.	Educational status	0.151	0.063	0.069	0.37
3.	Family status	0.124	0.063	0.066	0.34
4.	Caste	0.195	0.964	0.242	0.00
5.	Occupational status	0.232	-0.032	0.060	0.57
6.	Farming experience	0.316*	0.022	0.009	0.02
7.	Farm size (owned)	0.139	-0.052	0.068	0.42
8.	Location of owned land	-0.009	-0.159	0.078	0.08
9.	Location of encroached land	0.066	-0.357	0.139	0.01
10.	Irrigation source	0.154	-0.031	0.122	0.79
11.	Annual income	0.214	0.007	0.101	0.39
12.	Economic motivation	0.735**	0.105	0.012	0.00
13.	Aspiration	0.340*	0.057	0.43	0.18
14.	Gregariousness	0.351*	0.078	0.048	0.11

*Significant at 0.05 level of probability; **Significant at 0.1 level of probability
R² = 0.815; F = 10.720**

nk will pave a way for encroaching the tank bed at higher level. Encroachers' basic urge was to earn more money. Generally tank bed soil was fertile compared to other soils. Encroachment in tank bed involved without any initial investment on land and hence induced the encroachers to encroach higher area to earn more money.

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An encroacher with more experience in farming would have more motivation and aspiration to increase his encroached land size. The encroached land was mostly used for agriculture. Agriculture is the primary occupation in the villages studied. Majority of the encroachers were landless, farmers as well as wage earners. Because of these encroachers had high level of farming experience, which led them to extend their encroached land size.

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Training Needs of Rice Growers in Jammu District of Jammu and Kashmir

Yogesh Kumar¹, Ummed Singh², G.R. Bhagat³ and M.S.

The present level of rice production in India needs to be increased in order to meet the ever increasing demand. It is estimated that India will require 100 million tonnes in 2010 and 140 million tonnes of rice in 2025 against the present production of 86.31 million tonnes. The required level of production can be achieved through the increased production which requires high management practices, efficient input supply system, quality genetic material and above all the understanding and knowledge of the practicing farmers need to be strengthened to respond to the challenge. The potential of the training in imparting knowledge, skills and understanding is well established and stands good in case of rice also. The R.S. Pusa block of J&K is well known for its scented rice world over but the potentials are still unharnessed. The present study was undertaken to assess their training needs of farmers in various subject matter areas of rice production.

METHODOLOGY

The study has been undertaken in R.S. Pura block of Jammu district. Multistage sampling technique was followed to select the rice growers. At first, four villages namely Abdal, Deblehar, Badyal-Brahamana lower and Chohala were selected and at second stage 20 rice growers from each village were selected making a total of 80 farmers. The data were collected with the help of pre-structured interview schedule. The rice growers were asked to indicate their training needs for various items of cultivation of rice crop on three point continuum ranging from most important, important and less important on assigning scores of 3, 2 and 1 respectively. The scores obtained by the rice growers have been summed up and cumulative scores were calculated to reflect the training

need of a respondent as a whole as well as in the specified area.

The extent of training need was measured on the basis of three categories, viz., 'Low', 'Medium' and 'High'. The lowest mean score was worked out as 1.16 and the highest mean score was 2.95. Further the classification range was divided by three and three categories were formed on the basis of obtained mean scores as " $1 < 1.75$ ", " $1.76 < 2.35$ " and " $2.36 < 2.95$ " for low, medium and high extent of training needs respectively.

RESULTS AND DISCUSSION

Training needs in relation to management of water and soil for rice growers were measured in terms of broad heads i.e. at the time of nursery growing and nursery growing to before transplanting. Post transplanting growing was further divided into four items viz. tillage condition for rice cultivation, soil sampling and testing, soil reclamation, and techniques of field preparation. The study showed that the soil sampling and testing was ranked as 'most important', subject area of training almost the rice growers with mean score of 2.95 followed by the soil reclamation with mean score of 1.97. The other subject areas were ranked as less important areas.

Training needs in relation to seed technology (1) for rice cultivators was studied in four parts viz. selection of seeds for nursery, seed treatment, seed rate and methods of sowing, and seed storage. A majority of rice grower needed training, for 'seed treatment' area was ranked as high training need area with a mean score of 2.77 followed by 'seed storage'. The other sub areas viz. selection of seed and seed rate and methods of sowing were ranked as low needed areas.

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Table 1. Training needs in relation to seed technology (N=80)

S.No.	Subject matter areas	Percentage of rice growers			Mean score	Rank	Extent of training
		Most important	Important	Less important			
1.	Selection of seeds for nursery	8.75	38.75	52.5	1.56	3	Low
2.	Seed treatment	83.75	10	6.25	2.77	1	High
3.	Seed rate and method of sowing	6.25	32.5	61.25	1.45	4	Low
4.	Seed storage	6.25	52.5	41.25	1.65	2	Low

Table 2. Training needs in relation to use of manure and fertilizers (N=80)

S.No.	Subject matter areas	Percentage of rice growers			Mean score	Rank	Extent of training
		Most important	Important	Less important			
1.	Time and doses of manure	3.75	20	76.25	1.27	3	Low
2.	Time and doses of chemical fertilizers	11.25	38.75	50	1.61	2	Low
3.	Time and doses of bio-fertilizers	80	17.5	2.5	2.77	1	High

The data in Table 2 show the training needs in relation to use of manure and fertilizers. Training need for time and doses of bio-fertilizers was ranked high with a mean score of 2.77, whereas time and doses of chemical fertilizers was rated next with a mean score of 1.61. This may be due to the fact that the cost of chemical fertilizers is increasing day by day. As an alternate the farmers may be interested in adopting the biofertilizers for rice cultivation in order to reduce the cost of cultivation and dependence on State Agriculture Department for supply of chemical fertilizers.

Training needs in relation to management of irrigation for rice growers was measured for its water requirement for nursery and main crop and time and methods of irrigation. As much as 74 per cent of farmers reported 'Less Important' training area for both the items

of irrigation with their mean scores i.e. 1.31 and 1.28 respectively.

Training needs in relation to insecticides and pesticides were measured with three subject matter items i.e. knowledge of weeds and their control, awareness of common disease and insects, and time, doses and methods of using insecticides and pesticides. Overwhelming majority of rice growers expressed training needs for the item time, doses and methods of using insecticides and pesticides.

Training needs in relation to pre and post harvesting activities for rice cultivators were studied on three aspects viz. time and methods of harvesting, threshing and winnowing, and marketing and storing. About 56 per cent of farmers were interested in increasing the knowledge for 'marketing and storing' with mean a score of 1.98.

Research Note

Entrepreneurial Behaviour of Vegetable Growers of Tamil Nadu

G. Sudhakar¹, and G. Tamilselvi²

The Country's population is increasing at the rate of 1.8 per cent. Our vegetable requirement in 2010 will be around 135 million tonnes. Besides the domestic consumption, India exports sizable quantity of vegetables and processed products and earns foreign exchange. However productivity of different vegetables in our country is comparatively lower than the world's average productivity. In order to meet the demands of growing population as well as the export requirements, the production has to be still increased. Entrepreneurship has now been recognized as a concept, not only for starting industries but also in the development of agriculture and horticulture productions. An entrepreneur growing vegetables can produce more by adopting all the modern technologies, able to market better by acquiring market intelligence, and identify proper market channels. He also takes risk in adopting new practices or ideas, takes rational decision, and coordinates farming operations that would lead to maximum profit.

Keeping the above points in mind, this study was taken up in Villupuram District of Tamil Nadu to analyse the entrepreneurial behaviour of vegetable growers.

METHODOLOGY

The study was conducted in Villupuram District of Tamilnadu. Based on the area under vegetable, two blocks namely Koliyanur and Olkkumr were selected for the study. Four villages were selected from each block again considering the area. A sample of 120 vegetable growers were selected from these villages by following the proportionate random sampling procedure. The entrepreneurial behaviour was studied under nine components viz., innovativeness, decision making, achievement motivation, risk orientation, self-confidence,

leadership ability, co-ordinating ability, knowledge about vegetable cultivation and marketing ability. The scores against all these nine components were added together to arrive at the score for entrepreneurial behaviour.

RESULTS AND DISCUSSION

Age: More than half of the respondents (52.50 per cent) were young followed by 43.30 per cent of the respondents in middle-aged category.

Entrepreneurial behaviour the selected vegetable growers

The entrepreneurial components selected to study the entrepreneurial behaviour of vegetable growers were innovativeness, decision making, achievement motivation, risk orientation, self-confidence, leadership ability, co-ordinating ability, knowledge about vegetable cultivation and marketing ability.

The results on the distribution of respondents according to their overall entrepreneurial behaviour are presented in Table 1.

Table 1. Distribution of respondents according to their overall entrepreneurial behaviour (N=120)

S.No.	Category	No. of	Per cent respondents
1.	Low	30	25.00
2.	Medium	53	44.17
3.	High	37	30.83
	Total	120	100.00

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Table 2. Distribution of respondents according to their entrepreneurial behaviour under different components (N=120)

S. No	Components of entrepreneurial behaviour	Low		medium		High	
		Number of respondents	Per cent	Number of respondents	Per cent	Number of respondents	per cent
1.	Innovativeness	34	28.33	50	41.67	36	30.00
2.	Decision making	30	35.00	46	38.33	44	36.37
3.	Achievement motivation	5	35.00	45	37.50	70	58.33
4.	Risk orientation	6	4.17	56	46.67	58	48.33
5.	Self-confidence	22	5.00	65	54.17	33	27.50
6.	Leadership ability	32	18.33	54	45.00	34	28.33
7.	Co-ordinating	35	26.67	44	36.67	41	34.17
8.	Knowledge about vegetable cultivation	29	29.16 24.17	56	46.67	35	29.16
9.	Marketing ability	37	30.83	46	38.34	37	30.83

The data in Table 1 reveal that many of the respondents (44.17 per cent) were found to be medium in their entrepreneurial behaviour followed by 30.83 per cent of the respondents with high entrepreneurial behaviour followed by 30.83 per cent of the respondents with high entrepreneurial behaviour. It could be inferred that three-fourth of the respondents (75.00 per cent) possessed medium to high entrepreneurial behaviour.

In order to have an in-depth understanding of the entrepreneurial behaviour further analysis was made and the results are presented in Table 2.

It could be seen from the Table 2 that majority of the respondents had high level of achievement motivation (58.33%) and risk orientation (48.33 %). More than fifty per cent of the respondents (54.17 %) had medium level of self-confidence. More than two-fifth of the respondents were found to be medium regarding the following three components viz, innovativeness (41.67 per cent). Leadership ability (45.00 per cent) and knowledge about vegetable cultivation (46.67 per cent). Majority of the respondents were found to be medium in most of the entrepreneurial components viz., innovativeness, decision making, self-confidence, leadership ability, co-ordinating ability, knowledge about vegetable cultivation and marketing ability.

Relationship of Characteristic of vegetable growers with Entrepreneurial Behaviour

The results on zero order correlation of characteristics of vegetable growers with their entrepreneurial behaviour are presented in Table 3.

From table 3, it is interesting to observe that out of the fourteen characteristics studied, the correlation values of twelve variables were found to highly significant at 0.01 level of probability with the entrepreneurial behaviour of vegetable growers, except two variables viz., caste and social participation which were non-significant.

The relationship between age and entrepreneurial behaviour was found to be negative and highly significant.

Table 3. Relationship of characteristics of vegetable growers with enterprenurial behaviour (n=20)

S. No.	Variables	Correlation value
1.	Age	-0.7972**
2.	Education status	0.4096**
3.	Caste	-0.299NS
4.	Occupation	-0.5804**
5.	Farm size	0.8444**
6.	Experience in vegetable cultivation	-0.7274**
7.	Annual income	0.5862**
8.1	Family type	0.4750**
8.2	Family size	0.3561**
9.	Farm power possession	0.7746**
10.	Livestock possession	0.7577**
11.	Social participation	0.021NS
12.	Information source utiliaizon	0.7582**
13.	Training programmes attended	0.7539**
14.	Perceived profitability	0.6456**

This explains that if the farmer is young in age, his entrepreneurial behaviour would be high. As already discussed majority of the respondents selected for the study were young in age and this would have resulted in high entrepreneurial behaviour.

Occupation had a negative and significant relationship with entrepreneurial behaviour of vegetable growers. Almost all the respondents has agriculture either as their primary or secondary occupation, people engaged in agriculture. This may be the reason for the negative and highly significant relationship reported.

The negative and highly significant relationship between experience in vegetable cultivation. This might have ignited their desire to achieve better and hence would resulted in negatively significant relationship.

Educational status of the respondents was found to have positive and highly significant relationship with the entrepreneurial behaviour. It is clear that education is an important factor determining the entrepreneurial orientation of individuals as cited by many researchers.

The relationship between annual income and entrepreneurial behaviour of the respondents was found to be positive and highly significant. This otherwise means that if the annual income is high, the entrepreneurial behaviour would also be high.

Information source utilisation had a positive and significant relationship with the entrepreneurial behaviour of respondents. Because a person could become an entrepreneur only when he is informative and has utilised all possible sources of information.

A Scale to Measure Attitude of Dairy Farmers Towards Dairy Farming

Jasbir Singh Manhas¹, V.P. Sharma² and K.L. Dangri³

The progress in the animal husbandry development and research has replaced livestock keeping, in some areas of the country, from a mere way of living to a profitable and economic enterprise. The attitude of farmers towards improved dairy farming practices has a critical role in modernizing the dairy farming. In the past, studies conducted by Sawant and Dhole(1978), Sankhala and Chand(1998), Sharma and Singh(1998) and Rathore *et al.* (2001) have reported that attitude of dairy farmers play an important role in adoption of dairy innovations. Naturally, the knowledge about the attitude of the dairy farmers towards dairy farming, would help to develop dairy extension programmes.

Keeping the above context in mind, an attempt has been made to develop a scale to measure attitude of dairy farmers towards dairy farming which may be used by researchers and extension workers as well.

Attitude has been defined "as the degree of positive or negative affect associated with some psychological objects" (Edwards 1969). The psychological object for the present study was dairy farming.

METHODOLOGY

To measure attitude of dairy farmers towards dairy farming, the method of summated rating suggested by Likert (1932) was used. The procedure followed for scale construction was as follows:

Collection of items : The first step in the construction of attitude scale was to collect statements about dairy farming. Hence, 50 statements were collected based on review of literature, subject matter specialists and discussion with scientists.

Editing of statements : All the statements were edited by applying the 14 informal criteria and guidelines given by Edwards(1957). Out of 50 statements collected initially, 40 attitude statements relevant to dairy farming were selected.

Experts' rating of attitude statements : The selected 40 statements were given for judgement to a group of 40 experts comprising Veterinary Assistant Surgeons, Extension Officers(A.II.) and experts in the field of extension education, social sciences and veterinary sciences. The statements were administered on a three point psychological continuum, the points being 'most appropriate', 'appropriate' and 'inappropriate' with scores 2, 1 and 0, respectively. The judges were asked to give their favorableness / unfavorableness about the appropriateness of the statements in measuring the attitude of dairy farmers towards dairying. The statements were arranged in descending order based on total score for individual statements. These statements were classified as positive and negative. The positive and negative statements were arranged separately in the descending order based on total scores. The statements with more than 75 percent agreement scores were retained. In this way 30 statements were selected.

Item analysis Further, it was considered essential to delineate the items that discriminate between persons having different attitudes. A list of 30 statements having more than 75 percent agreement scores was administered to 60 dairy farmers from non-sampled area. The responses from them were elicited on a five point continuum namely, strongly agree, agree, undecided, disagree and strongly disagree. If the item was positive (favourable to the subject under study) strongly agree

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was given the numerical value of 5, agree 4, undecided 3, disagree 2 and strongly disagree 1. While in case of negative items (unfavorable to the subject under study) the scores were reversed. The score for each individual was obtained by summing up the scores over all items. Considering the total score earned by each respondent they were arranged in descending order. Then 25 percent (i.e. 15) of dairy farmers with the highest total score and also 25 percent (i.e. 15) of them with the lowest total score were selected. These two groups provided the criterion groups as 'high' and 'low' groups to evaluate the individual item. The critical ratio (t-value) for each item was worked out by the formula given by Edwards (1957).

$$T = \frac{X_H - X_L}{\sqrt{\frac{\Sigma(X_H - X_H)^2 + \Sigma(X_L - X_L)^2}{n(n-1)}}}$$

Where,

$$\Sigma(X_H - X_H)^2 = \Sigma X_H^2 - \frac{(\Sigma X_H)^2}{n}$$

$$\text{and } \Sigma(X_L - X_L)^2 = \Sigma X_L^2 - \frac{(\Sigma X_L)^2}{n}$$

Whereas,

ΣX_H^2 = Sum of the squares of the individual scores in the high groups.

ΣX_L^2 = Sum of the squares of the individual scores in the low groups.

X_H = The mean score on a given statement for the high group.

X_L = The mean score on a given statement for the low group.

n = Number of respondents in each group.

The 't' value is a measure of the extent to which a given item differentiates between the high group from the low group.

Selection of items for inclusion in final scale : The value of critical ratio 1.75 was observed to be significantly differentiating between 'high' and 'low' groups. The items having greater than 1.75 't' value were then selected for inclusion in the final format of the attitude scale. By this procedure 20 items were retained and included in the final format of attitude scale as shown in Table 1.

Reliability of the scale : The format of the scale consisting of 20 items was split into two halves on the basis of odd and even number of items and was administered to 20 dairy farmers of non-sampled area. The responses were obtained on five point continuum as strongly agree, agree, undecided, disagree and strongly disagree with a score of 5, 4, 3, 2 and 1, respectively. Thus, two sets of scores were obtained and then scores were correlated with each other. The correlation coefficient for two sets of scores was 0.72. Using Spear-Brown formula, reliability coefficient was calculated as:

Spear-Brown formula:

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

Where,

r_{oe} = (r) Karl Pearson correlation coefficient.

r_{tt} = The reliability of the original test.

The value of r_{tt} came to be 0.837 indicating reliability of the scale.

Validity of the scale : The contents of the attitude scale were derived from review of literature, consultation with experts and securing judges opinion on appropriateness of items included in the scale. Thus, it was assumed that the scores obtained by administering the attitude scale measured what was intended to measure. Moreover the 't' values being significant for all the 20 statements consisting the scale explained that the statements had high discriminating values, therefore reasonably enough, the scale was taken as valid measure of the desired dimension. This validity is termed as content validity.

Method of scoring : The developed scale contains 20 items, comprising 10 positive and 10 negative statements. The positive statements are 1,3,5,7,9,11,13,15,17,19 and negative statements are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20. Each item in the attitude scale has been provided with five response categories, strongly agree, agree, undecided, disagree and strongly disagree. For positive items, the weights were 5, 4, 3, 2 and 1, respectively. These were reversed for negative items. The total score of the respondent farmer for the 20 items in the scale was his individual attitude score. The maximum obtainable score according to the present attitude scale is 100, whereas minimum obtainable score is 20.

TABLE I. A scale to measure attitude of dairy farmers towards dairy farming

No.	r value	Attitude statements	Response categories SA A UD DA SDA
378		Dairy plays a vital role in agricultural development of our country	
229		More expertise and experience is essential for successful running of dairy, hence, everyone cannot take up dairying.	
307		In dairy farming, it is good to keep the dairy animals loose in the enclosure.	
247		Dairying is considered as poor man's profession.	
258		Dairy requires large initial investments, so everyone cannot take up this enterprise.	
309		Dairy development is an integral part of general economic development of weaker sections.	
347		Large herd size leads to high economic returns.	
288		Dairying has not improved the income and nutrition level of the rural poor.	
359		More risk and uncertainty is involved in dairy enterprise.	
402		Dairy development is important to the societies both on production and consumption aspects.	
547		Dairy is an integrated part of farming.	
251		Dairy is labour intensive, hence, suited to small farmers, marginal farmers and agricultural labourers only.	
319		Through scientific feeding, milk yield of dairy animals can be increased.	
267		Dairy is more complicated and complex job.	
337		More credit facilities should be made through banks for the purchase of dairy animals.	
481		In dairy farming, animals in the dry period can be neglected in matters of their feed.	
381		Vaccination against contagious diseases (F.M.D. H.S. etc.) in milch animals is not regularly needed.	
568		In dairy farming, artificial insemination is a good breeding practice.	
417		Cross-bred cows are uneconomical in comparison with native cattle breeds.	
473		Cross breeding programme has improved the production capacity of our native breeds.	

= Strongly agree, A= Agree, UD= Undecided, DA= Disagree, SDA= Strongly disagree

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