KVKs impact on Dissemination of Improved Practices and Technologies

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National Institute of Labour Economics Research and Development (NILERD)

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Acronyms

ATMA	Agriculture Technology Management Agency
CAZRI	Central Arid Zone Research Institute
CFCL	Chambal Fertilizers and Chemicals Limited
CICR	Central Institute of Cotton Research
CIVE	Central Institute of Agricultural Engineering
CORT	Collaborative Outcome Report Technique
FC	Farmers' Clubs
FGD	Focus Group Discussion,
FLD	Frontline Demonstration
FYM	Farm Yard Manure
GSDP	Gross State Domestic Product
HYV	High Yielding Varieties
IAMR	Institute of Applied Manpower Research
ICAR	Indian Council of Agricultural Research
ICT	Information and Communications Technology
IDM	Integrated Diseases Management
IEG	Independent Evaluation Group
IFS	Integrating Farming System
IIFCO	Indian Farmers Fertilizer Cooperative Limited
INCCA	Indian Network of Climate Change Assessment
INM	Integrated Nutrient Management
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
JLNKV	Jawahar Lal Nehru Krishi Vishwavidyalaya
KVIC	Khadi & Village Industries Commission
KVK	Krishi Vigyan Kendra
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MSP	Minimum Support Price
MYRDA	Mysore Resettlement and Development Agency
NABARD	National Bank for Agriculture and Rural Development
NADP	National Agriculture Development Programme
NHM	National Health Mission
NILERD	National Institute of Labour Economics Research and Development
NIPHM	National Institute of Plant Health Management
NITI	National Institute for Transforming India
NSSO	National Sample Survey Organization
OFT	On Farm Trials
PC	Programme Coordinator
PIRENS	Pravara Institute of Research and Education in Natural and Social Science

PRA	Participatory Rural Appraisal,
RCTs	Randomized Control Trials
RDRF	Rural Development & Rural Foundation
SAU	State Agriculture University
SBA	Strength Based Approach,
SCAD	Social Change and Development
SHG	Self-Help Group
SMS	Subject Matter Specialist
SRI	System Rice Intensity
SURE	Society to Uplift Rural Economy
TNAU	Tamil Nadu Agriculture University
TOC	Theory of Change
UPASI	United Planters' Association of South India
ZARC	Zonal Agricultural Research Centre

Preface

Given the limited scope for increasing agricultural production through expansion in cultivated area, the only alternative to meet the requirements of the increasing population is through productivity. Over the years Indian agriculture has made tremendous progress due to the contributions of agricultural science and technology through development of improved seeds and planting material, pre and post-harvesting technologies, disease control & plant protection, irrigation & soil conservation techniques and use of machinery in agriculture. In spite of the various interventions by the Government, agriculture universities, research institutions and other stakeholders, the productivity of Indian agriculture still remains low compared to many developing and developed countries, which is a cause for concern.

Agricultural innovations and diffusion of new technologies are key drivers to attain food security in the country besides providing farmers a competitive edge over traditional farming, thus facilitating better standards of living. To realize their true potential, farmers must have access to the state-of-the-art technologies, necessary inputs and related information in all the segments, be it crop, livestock, forestry or fisheries. In this context, the Government of India through Indian Council for Agricultural Research (ICAR) has established a wide network of Krishi Vigyan Kendras (KVKs) in all the rural districts of the country. These KVKs under the aegis of the National Agricultural Research and Education System, are the real carriers of frontline technologies and impart knowledge and critical input support for the famers.

I am glad that the Agricultural Extension Division of ICAR has awarded the study to the Institute of Applied Manpower Research (IAMR) now known as the National Institute of Labour Economics Research and Development (NILERD) to conduct the Impact Assessment of KVKs on dissemination of improved practices and technologies to farmers. The study intends to examine the efficacy of KVKs' services, assess them in terms of infrastructure and human resources, impact of new knowledge and practices on farmers' farming practices and the effect of new knowledge adoption by farmers on their incomes and quality of life. It is based on field surveys of 48 KVKs in five States viz. Rajasthan, Madhya Pradesh, Maharashtra, Tamil Nadu and Arunachal Pradesh. To substantiate, focused group discussions (FGDs) have been conducted with various stakeholders.

The study finds major differences in the performance of KVKs – while some were performing quite well, others were below the benchmark. Many KVKs seem to be facing problems of low visibility, inadequate infrastructure, insufficient field staff and locational constraints limiting their outreach to the farmers. Gaps have also been observed in the capacities of many KVKs in terms of knowledge of emerging technologies, availability of scientific equipments for testing and other machinery, mismatch between human resource requirements and actual positions filled, inadequate mechanism for feedback from farmers, and so on. With a number of initiatives being taken by the Government for farmers, these KVKs can be effectively developed as one stop resource centres for all agri-related activities and technology transfer with forward and backward linkages. Coordination and convergence with other Departments and schemes is also expected to be of significant help in providing a wholesome package to farmers. KVKs also need to accord focused attention on different segments of rural population viz. old farmers,

women and youth keeping in view their specific expectations. These recommendations are covered in detail in Chapter 8 of the Report.

This report is an outcome of immense hard work and collective effort of a dedicated team of researchers, supported by technical as well as administrative staff of NILERD. The process of preparation of report involved close and continuous consultations and dialogue with the Advisory Committee set up by ICAR, experts of the Agricultural Extension Division of ICAR, other distinguished experts and officials of the KVKs in different districts. Feedback from farmers and their practical experiences at the grass root level have enriched the report.

I wish to express my gratitude towards Dr. Ramesh Chand, Director, National Institute of Agricultural Economics and Policy Research (NIAP); Dr. A K Singh, DDG, Extension Division, ICAR; Dr. A K Vasisht, ADG (PIM), ICAR and Dr. Harjeet Kaur, Principal Scientist, ICAR for providing their expert views on various aspects of the project from time to time. I am thankful to the distinguished members of the Advisory Committee viz. Dr. Pratap Singh Birthal, Principal Scientist, NIAP; Dr. V P Chahal and Dr. P Adiguru, Principal Scientists, Extension Division. I acknowledge the efforts made by the Zonal Heads of selected KVKs without whose cooperation it would have been extremely difficult to organize the field work. The project could be completed on time due to the contributions made by the Programme Coordinators, Subject Matter Specialists and other officials of KVKs. There had been wide consultations and dialogue with farmers, officials of the respective State Governments, representatives of NGOs and other experts. Data have been collected from a large number of farmers of different states. I am grateful to all of them.

I wish to place on record my appreciation for Shri B V L N Rao for his continuous guidance in firming up the methodology and providing technical inputs for collating and analyzing the information collected from the field besides preparation of the report. The project has been conducted by a core team and a survey team comprising experienced research faculty of the Institute headed by Dr. Rashmi Agrawal, Director, NILERD. Various units of the Institute such as finance, administration and computer section have helped in executing the project. Editing has been done meticulously by the editorial section. Secretarial assistance has been provided and data entry work has been done by dedicated staff of the Institute. I place on record my sincere gratitude to all of them.

I am pleased to present this report for consideration of ICAR. I hope it would be useful for policy planners and other professionals associated with the impact assessment of farming technologies.

Dr.Yogesh Suri
Director General

Executive Summary

Enhancing the socio-economic standards of rural farmers by upgrading their knowledge and skills is the main objective of transfer of technology. Acquisition and application of technology does not stand alone, but is conditioned by political, social, economic, and cultural factors that can impede the diffusion or transfer of technology. One of the major concerns in the transfer process is how to disseminate effectively new technologies considering the viewpoint of farmers, particularly in addressing the questions of where, how, and what technologies are appropriate to a given socio-economic milieu.

2. Agricultural innovations and diffusion of new technologies are important factors for all developing countries like India in their quest for food and nutritional security. Farming in different resource endowments must be sustainable, economical, and intensive in order to provide dependable, long-term support forrural households. To achieve these, farmers must have access to sustainable technology in crop, livestock, forestry, fisheries and other agri- related sectors. The Indian Council of Agriculture Research (ICAR) has established a network of 642 Krishi Vigyan Kendras (KVKs) across the country with an aim to conduct technology assessment, refinement and demonstration through various activities. In view of the changing scenario of agriculture, the activities of KVKs need to keep pace to address newer challenges in the areas of climate change, market led extension, mechanization, agri-business and so on. It is to be ascertained if the new technologies are percolating to the ground level. Are farmers inclined to accept new inventions? Are these changes becoming accessible to farmers and helping them in any way and how effective is the role of KVKs in meeting these goals, are some of the questions to which ICAR is seeking answers through this study awarded to the Institute of Applied Manpower Research now known as NILERD functioning under the aegis of NITI Aayog, Government of India.

3. The specific objectives of the study are:

- Studying the efficacy of KVKs' services, both in public and private KVKs.
- Assessing KVKs in terms of infrastructure and human resource.
- Assessing the impact of new knowledge and practices on farmers' farming practices.
- Assessing the impact of new knowledge adoption by farmers on their incomes and improved quality of life.

4. The study has been conducted using a mixed methodology approach where quantitative data has been collected through structured questionnaires administered to KVKs, and an interview schedule for farmers of various sampled states and districts, supplemented by qualitative data collected through individual interactions and focus group discussions (FGDs) with various stakeholders such as experts, scientists and other officials of Government and community

organizations, farmers and their family members. This impact evaluation design has been found beneficial in bringing out focused results for the study.

5. Stratified random sampling has been used to select States and KVKs. The country has been divided into five regions: North, South, Central, West, East/North East. One state from each region has been selected on the basis of random sampling. Thus a total of five states were selected for primary survey and from each state, a sample of 10 KVKs has been selected (12 in Madhya Pradesh) on random basis after distributing the total sample among Government, SAUs and other KVKs approximately proportionately ensuring that all types of KVKs are covered. In Arunachal Pradesh the number of KVKs is small (only 13) and that too all are government KVKs. Therefore, 50% sample (6 KVKs) was chosen for primary survey in the state. To assess the impact of KVK's technology dissemination about fifty farmers from each selected KVKs district have been interviewed. In all, 48 KVKs (2 KVKs gave the information voluntarily) and 1,870 farmers could be covered by the study.

6. It is important to mention that although efforts have been made to select a comparison group of farmers who are totally unaware of the new technologies or developments in agriculture with whom farmers with access to KVK technologies (beneficiary group) could be compared, it was almost impossible to select such a farmers' group totally unaffected by KVKs because of the operation of both internal (learning from fellow farmers) and external (dissemination by agencies other than KVKs) contamination factors.

7. A conceptual framework has been developed in terms of Theory of Change to understand the process of change that was expected to lead to the observed impacts, validate results and provide a systematic framework for analysis of results.

8. Report contains a total of 8 chapters. Chapter 1 relates to the Indian agriculture and KVKs. Chapter 2 details the present study its objectives, methodology adopted and coverage. Chapter 3 describes various techniques of impact evaluation with suitability of chosen technique for this study. This chapter also mentions a conceptual framework of theory of change. Chapters 4 and 5 provide detailed analysis of inputs received from KVKs and farmers respectively and Chapter 6 indicates the outcomes of the detailed interactions with Government officials, representative of NGOs, farmers' organizations and farmers and other experts in various villages of the sampled districts. This chapter contains KVK-wise interaction outcomes as most of the KVKs covered in this study requested that the report should reflect their respective achievements and problems. Chapter 7 presents highlights of results and these results are discussed in the light of theory of change and previous studies. Chapter 8 puts forth key recommendations.

9. Some of the highlights of the results from the inputs given by KVKs and farmers are:
    - Objective 1 of the study had been to study the efficacy of services. KVK is doing only frontline extension activities and it may not reach out larger percentage of farming community. KVKs are responding well to requests from farmers for information. However, response in dealing with the requests relating to demonstrations is to the extent of only 40%. KVKs felt that rich farmers, those with secondary or higher education and those whose landholdings were comparatively large were more likely to implement new technologies. KVKs carry out activities as per the broad guidelines for adopting villages and keeping in mind the resources. It has come to light that generally they cover the villages for their mandated activities in their close vicinity and villages in remote and far-flung areas remain uncovered. The KVKs under NGOs have moved faster than others. Generally KVKs are involving other agencies in their activities.
    - About one-fourth of the farmers covered were not aware of the existence of KVKs or their activities, especially those with low farm holdings and low education. In the absence of any other criterion, this group of farmers which did not display any awareness of the activities of KVKs was taken as the comparison group for this study. Farmers generally were of the opinion that KVKs had very limited outreach. This finding may be seen in the context of KVKs mandate as they are only front line demonstration system.
    - The results on objective 2 show that KVKs are short of staff and required infrastructure. A high percentage of vacancies are there in SAUs and there are more vacant positions in Maharashtra and Rajasthan. There are also problems relating to insufficient and untimely budget.
    - Objective 3 of the study relate to transfer of technology and its adoption. The results show that average number of technology transfer is 7.5 per year by each KVK and about 64% relate to crop science and 21% to horticulture. About 40% farmers implement the technology immediately while others in next season or after seeing the results. 42% of the technologies adopted resulted in higher productivity and about a third in enhancing incomes, one-fifth of the technologies reduced drudgery. Comparison group got information from fellow farmers indicating the spill over effect of technology transfer by KVKs
    - More than 50% farmers have mechanized their farm operations; the ownership of farm machinery increased with size of holdings; families involved in both agriculture and non-agriculture activities have better incomes as compared to those involved with agriculture only. The role of fellow farmers was found important in spreading new technology.
    - About 80% farmers reported modifications in their agricultural patterns after intervention of KVKs which were related to diversification of crops and changes in cropping pattern, and use of fertilizers and pesticides, and some farmers reported changes in machinery used and in water use pattern.

- The technologies relating to systematic cultivation process, seed planting technique, water management, integrating farming system, feed management, and proper use of chemical fertilizers were reported as having been beneficial to the farmers.
- A much larger proportion of the farmers in the beneficiary group (93.7%) had changed their farming methods during the last five years than the comparison group (62.7%). Several farmers who responded to the query on increased production and incomes reported at least 10% increase both in production and income after KVKs' intervention.
- The results on the objective 4 show that a larger percentage of farmers in beneficiary group reported an increase of 20% or more in incomes and production as compared to comparison group indicating the positive contribution to farm incomes through KVKs' technology transfer. Enhanced incomes are spent in construction of house, better education and health for family and better inputs for agriculture; some improper use of enhanced income has also been observed. A large proportion of farmers in beneficiary group changed their farming practices than the comparison group showing the influence of KVKs .
- KVKs have an edge in technology transfer over other service providers by virtue of their having better technical expertise and demonstration units.
- Most of the KVKs were of the opinion that a number of technologies were gender sensitive and had helped in reduction of drudgery, income enhancement and developing self-confidence among women thus making them empowered.
- Some factors that hamper technology transfer and adoption include difficulty in getting suitable technologies, non-availability of any backup of technology if required by farmers and the inability of KVK scientists to provide them suitable alternatives, lack of input delivery system and availability of planting material and other farm inputs on the part of KVKs. Poor socio-economic status of farmers and small holdings, non-availability of low cost technologies, lack of forward and backward linkages especially post harvesting management, marketing and value addition etc. are the factors that hamper technology adoption on the part of the farmers. This is the view of the farmers. However as per mandate, KVKs activities are limited to assessment and demonstration of technologies. Any need for newer technologies are communicated to the research system as a feedback thereby acting as a link between research and extension. It is to be considered if KVKs activities could be expanded to take into account the needs of the farmers.
- About 25% time of KVKs is devoted to each of the non-mandated agricultural activities and non-mandated non-agricultural activities.

11. Results according to Theory of Change framework indicate that from inputs to activities and activities to outputs there is a direct causal link in the activities of KVKs which indicates the 'attribution' connect. From outputs to outcome the study indicates that KVKs are playing an important role in achieving the outcomes as a main contributing factor. When the impact of the interventions of KVKs has been determined, a number of influencing factors have been found to

play their role. There had been intervening factors like floods, droughts, etc. that influenced intended impacts. Results have also been discussed in the light of results of the other studies in the related areas.

12. The study has brought out certain areas which require further researches to make the technologies more effective and efficient as per local needs; for instance, research is needed for short duration varieties of crops that can withstand the vagaries of nature or seeds that require less irrigation due to scarcity of water, research on cutting the cost of production, suitable equipments for small farms and hilly regions and so on.

13. Recommendations and action points have been outlined in two broad sections detailing major themes in each section. The first section relates to improving performance of KVKs within their existing mandate and the second section contains suggestions for a vision for future.

14. Recommendations for improved performance by KVKs within the current mandate relate to infrastructure and resources, flow of technologies from lab to KVKs, outreach of KVKs, non-mandated activities and issues relating to certain policies. Some of the major recommendations are that there is a need to strengthen KVKs in terms of all types of resources; a uniform procedure for transfer to technology from research labs to KVKs at fast pace; measures to be adopted to increase the outreach of KVKs by adopting innovative techniques (forming farmers groups, train farmers-trainer, redefining cluster approach, continuous interaction at village level, need based training, use of ICT, etc.), exempt KVKs from unproductive duties and re-look into the existing policies regarding providing subsidies, capacity building of KVK staff, regulatory authority for distribution of inputs, etc.

15. Recommendations regarding future vision relate to KVKs as resource centers, operation, implementation and coordination, farmers' needs and KVKs role in transforming rural India. These include development of KVKs as resource centers on farm technologies; technology transfer should come as a complete package covering backward-forward linkages; modernization of soil testing labs; defining responsibilities of each organization involved with transfer of technology; keeping the farmers' needs in focus while providing training; focus upon new emerging areas like climate change, pro-harvest management and non-farm activities.

16. KVKs can play an important role in transforming rural India. Interventions of KVK should target the family and not the individual farmer which is a guiding principle of KVKs. KVKs should come out of 'inside the wheel' approach and should also cater to the needs of small and marginal farmers with innovative mind sets. A number of farmers are doing various innovations that should be taken a note of. There is a need for following bottom-up approach also and researches done at field level should also reach to laboratories for validation. As such KVKs approach is to encourage farm innovators and documenting success stories and to follow inclusive approach. Some KVKs are doing very well in this direction while others may give more emphasis may be given to these aspects while working at field level.

To sum up, the study leads to the observation that KVKs are playing a pro-active role in transferring new technology at field level and with beneficial impacts, but a lot is yet to be done. It is high time that KVKs are strengthened and their mandated activities are reviewed from time to time and expanded in the light of the present day needs of rural India. Here it is also necessary to mention that some of the recommendations are out of the purview of KVKs and objectives of the study team but these have been mentioned as they came to light during the study and are important to make KVKs work effective.

Chapter 1

Indian Agriculture and Krishi Vigyan Kendras

1. Introduction

A large number of institutions in the field of agriculture and allied sectors are contributing to research in development of high yielding varieties of crops, technological innovations and other initiatives to boost production and human resource development. The technology available has to be permeated depending upon the necessities of the region – its soil, climate, culture and needs and means of the farmers, available human resources, feasibility and viability of different parts of the country. It has been observed that there are variations in knowledge and technological percolation. The National Commission of Farmers (founded in 2004) raised the issue of knowledge deficit, which directly impinges on agriculture productivity. There are significant gaps in backward and forward linkages between the agricultural laboratories and the farmers, insofar as transfer of technology is concerned. The 10th and 11th plans have emphasized the need for effective extension services. The 11th Plan Approach Paper also states that "in the longer run, growth in agriculture productivity can be sustained only through a continuous technological progress". This continuous technological progress would require high priorities not only for basic research but also, equally importantly, to ensuring that the results of such research go to the lowest echelons of the agriculture and allied sectors.

The 11th Plan shows a concern towards the problem of transfer of technology and knowledge at grass-root level and puts forth challenges before the extension agencies. The basic issue in the transfer of knowledge is how to deliver the knowledge to the farmers and how to implement the results of the research in the farms where landholdings are very small. The 11th Plan points out that extension services are to be treated as a service delivery mechanism. Thus, there is a need to study the status of the extension services, the problems and the remedies. The 12th Plan also emphasizes the need for mechanisation of agriculture with robust extension services. The two major factors critical to agricultural production that needs to be addressed are soil and water which are equally in focus (Budget, 2015).

1.1 Status of Indian Agriculture

Over the years Indian agriculture has made tremendous progress due to the contributions of agricultural science and technology through development of improved seeds and planting material, pre- and post-harvesting technologies, disease control and plant protection, irrigation and soil conservation techniques, use of machinery in agriculture resulting in reduction in

drudgery etc. In spite of the various interventions in agriculture by the Government, agriculture universities, research institutions and various other stakeholders, the Indian agriculture productivity remains low as compared to that at international levels. For example, the yield (kilograms per hectare) was 3,208 for paddy and 2,671 for wheat in India against the world averages of 4,152 and 2,792 respectively. The corresponding figures in China are 6,341 and 4,781. Similar differences in productivity can be witnessed in other crops as well. In the dairy sector India has tremendous potential for increasing the productivity. Several reasons have been attributed to this low productivity which includes inter alia technological factors as well as institutional factors. Under the technological factors irrigation facilities, use of fertilizers and high yield varieties, farm mechanisation, soil erosion, etc. are included. The institutional factors include small size holdings, lack of backward and forward linkages and transfer of knowledge from research to grass root levels. Indian agriculture in most of the regions depends upon the monsoon rains. Fertility levels of agricultural land have been falling with degradation of soil due to indiscriminate use of fertilizers and pesticides. Soil health has depleted and lost its nutrients. The National Bureau of Soil Survey and Land Use Planning (founded in 2005) has estimated that about 146 million hectares of area is suffering from various types of land degradation which include water erosion, flooding, salinity, soil acidity, etc.

About 62 per cent of the GDP in agricultural sector comes from crops (including horticultural crops). Livestock sub-sector contributes about 22 per cent, forestry about 10 per cent and fisheries about 5 per cent. Available data indicate a slight shift in the distribution away from the crop sector towards livestock and fisheries sub-sectors (Rao, 2014).

India is moving from primitive agriculture to modern mechanized farming but the change is very slow and only in some pockets of the country. Farm machinery industries have grown rapidly in order to meet the bulk of the requirement of mechanization inputs and also for export. An array of technologies is available such as plough, harrow, seed driller, horse hoe, threshing machines, tractor, power tillers, implements for clearing, breaking ground, implements for depositing seed, seed-sowing machines-drills, cane crusher, combine harvesters, post-harvest and processing machinery and dairy equipment, implements for the cultivation of the plant – cultivators, implements for gathering crops, implements for clearing, breaking ground, irrigation technology etc. Table 1.1 provides the status and growth of farm machinery industries.

Table 1.1: Year-wise Sale of Agricultural Machineries

Year	Energization of pump sets	Tractors	Power tillers	Four wheel tractors	Threshers	Diesel pumps	Electric pumps
2001	12823480	173181	16891	2833755	4202000	6347800	17538300
2002	13043926	254825	16018	3025838	4542000	6816600	20312600
2003	13792427	256688	18544	3217922	4882000	7285400	23086900
2004	14057268	266466	19983	3410005	5222000	7754200	25861200

2005	14462768	276205	21422	3602089	5562000	8223000	28625500
2006	14868267	285963	22861	3794172	5902000	8691800	31409800
2007	15273767	295722	24300	3986255	6242000	9160600	34184100
ACGR	2.38	4.56	4.78	4.22	3.77	4.48	7.18

Source: Agricultural Research Data Book, 2008, ICAR up to 2007, Projections for subsequent years on the basis of relevant Annual Compound Growth Rate

About 250 improved agricultural equipments and technologies have been designed and developed in India for various pre- and post-harvest operations operated by human, animal, mechanical and electrical power, for timely field operations (Pandey, 2006). Italia (2010) reported that farm mechanization (traditional to modern) takes place through activities at three levels, namely, village craftsmen, small industries and organized big industries.

Despite all these efforts, change has not yet percolated to various sections of the society uniformly. While the country has over three million tractors in use and produces over five million annually and stands second only to USA in terms of tractors, the density of tractors per thousand hectares is only 16 in the country as compared to the world average of 19, and 27 in the USA. On the one hand, while good quality of inputs like seeds and planting materials are necessary, extensive use of foreign technologies that are suitable to indigenous conditions are extremely essential, on the other.

Climate change is another area of concern for the agriculture sector. Vagaries of nature like floods, draughts, unusual and untimely rainfall in the country lead to low agriculture production and productivity. Indian Network of Climate Change Assessment (INCCA) study (Naresh Kumar et al., 2010) indicates that there could be a rise in the sea level, increase in cyclonic intensity, reduction in crop yield in case of the crops which are depending on rains, and reduction in milk. Intergovernmental Panel on Climate Change (IPCC) (2010) has predicted that productivity of most of the crops may decrease by 2 to 10% by 2020 and up to 30% by 2050 due to climate change.

According to successive agriculture censuses, average operational landholding size (all categories) has declined from 2.82 hectare in 1970-71 to 1.16 hectare in 2010-11. Small and marginal holdings of less than 2 hectare account for 85% of the total operational landholding (Agriculture Census, 2010-11). Increasing urbanization and industrialisation have further aggravated the pressure on farm landholdings owing to ever-increasing housing and infrastructure demands. Declining farm holdings necessitates mechanisation and use of farm friendly technologies for better yields.

The above discussions clearly indicate that there is a need for adequate transfer of technology and knowledge at grass root levels and also a continuous research in areas that are creating problems for the agriculture sector. The basic challenge in transfer of knowledge is how

it can be delivered to the farmers and how to implement the results at farm level where landholdings are small.

1.2 Krishi Vigyan Kendras (KVKs)

To cater to the needs of farmers and for transfer of technology from lab to land, Krishi Vigyan Kendras (KVKs) have been established by various State Agriculture Universities SAUs as well as Government under Indian Council of Agricultural Research ICAR system in all the states. Attempts have also been made by the private organizations (NGOs) to this effect. There were 569 KVKs in 2010 and by July 2011 the number increased to 598. At present, there are 634 KVKs – about one KVK in each district – which interact with farmers and impart training and knowledge about the new technologies and practices. The KVKs have twin roles – one is training of farmers in new technologies and another is demonstration.

The zone-wise distribution of KVKs may be seen in Table 1.2. There are 8 agricultural zones which are headed by zonal coordinating units. The zonal head is responsible for coordination and guidance to the KVKs under administrative control at district level.

Table 1.2: Zone-wise Distribution of KVKs

Zone	States	Number of KVKs
Zone I - Ludhiana		**70**
	1. Delhi	01
	2. Haryana	18
	3. Himachal Pradesh	12
	4. Jammu & Kashmir	19
	5. Punjab	20
Zone II - Kolkata		**83**
	1. Andaman N. Islands	03
	2. Bihar	38
	3. Jharkhand	24
	4. West Bengal	18
Zone III - Barapani (Meghalaya)		**78**
	1. Assam	25
	2. Arunachal Pradesh	14

	3. Manipur	09
	4. Meghalaya	05
	5. Mizoram	08
	6. Nagaland	09
	7. Sikkim	04
	8. Tripura	04
Zonal IV – Kanpur		**81**
	1. Uttar Pradesh	68
	2. Uttarakhand	13
Zone V - Hyderabad		**78**
	1. Andhra Pradesh	21
	2. Telangana	13
	3. Maharashtra	44
Zone VI Jodhpur		**71**
	1. Rajasthan	42
	2. Gujarat	29
Zone VII – Jabalpur		**100**
	1. Chhattisgarh	20
	2. Madhya Pradesh	47
	3. Odisha	33
Zone VIII – Bangalore		**81**
	1. Goa	02
	2. Lakshadweep	01
	3. Karnataka	31
	4. Kerala	14
	5. Puducherry	03
	6. Tamil Nadu	30
National Level		**642**

Source: KVK Telephone Directory, 2013, ICAR, New Delhi

The growth of KVKs over the various plan periods and state-wise distribution is shown in the Figures 1.1 & 1.2 below.

Figure 1.1: Cumulative Growth of KVKs in India

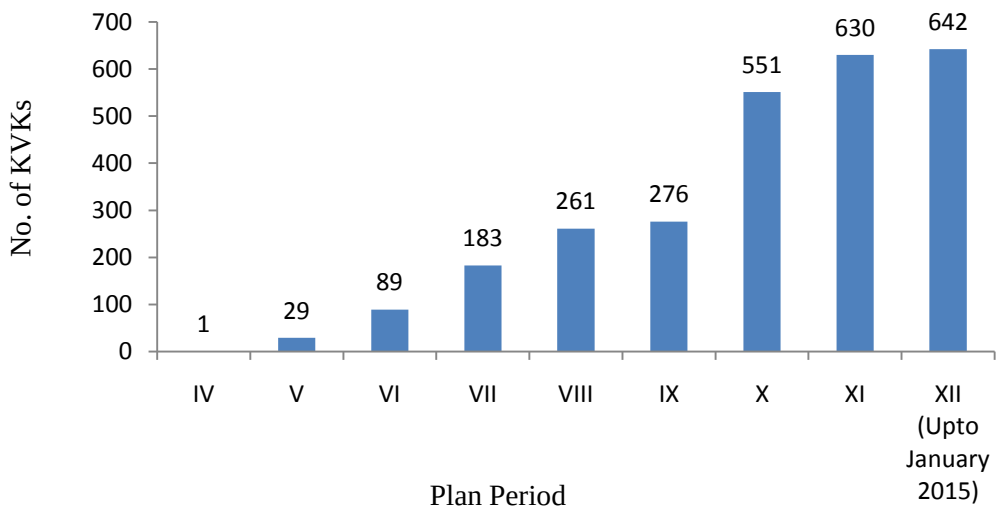
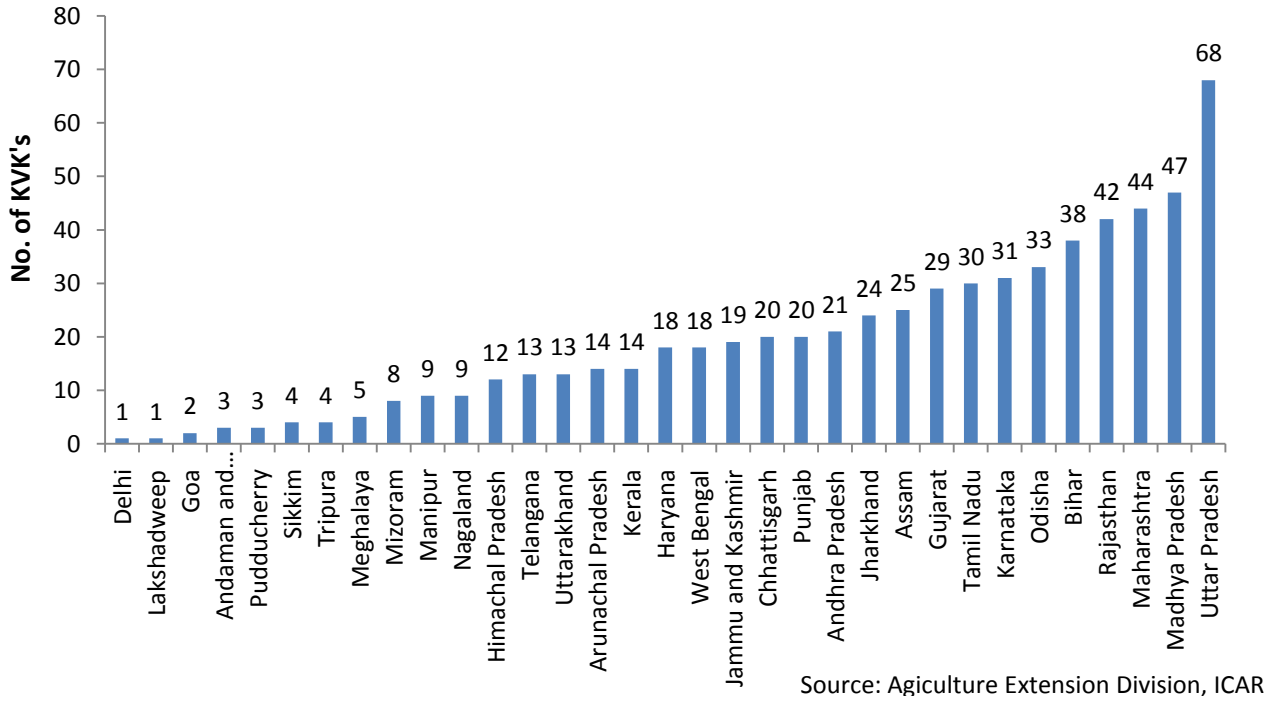


Figure 1.2: State/UT Wise Distribution of 642 KVKs in India: 2015



Source: Agiculture Extension Division, ICAR

The above information shows that KVKs have their existence in all the states and UTs across the country.

1.2.1 Mandated Activities

The mandated activities of KVKs are as follows:-

- Conducting "On-Farm Testing" for identifying technologies in terms of location-specific sustainable land use systems.
- Organising training to update the extension personnel with emerging advances in agricultural research on regular basis.
- Organising short- and long-term training courses in agriculture and allied vocations for the farmers and rural youths with emphasis on "Learning by doing" for higher production on farms and generating self-employment.
- Organising Front Line Demonstrations (FLDs) on various crops to generate production data and feedback information.

To operationalise the mandated activities, following broad objectives of KVKs are:

- To promptly demonstrate the latest agricultural technologies to the farmers as well as extension workers of State Departments of Agriculture/Horticulture/Fishery/Animal Science/NGOs with a view to reducing the time lag between the technology generation and its adoption.
- To test and verify the technologies in the socio-economic conditions of the farmers keeping in view the production constraints and to modify the technologies to make them appropriate.
- To impart training to the practicing farmers/farm women, rural youth and field level extension functionaries by following the methods of "Teaching by doing" and "Learning by doing".
- To back-up with training and communication supports to the district level development departments viz. Agriculture/Horticulture/Fisheries/Animal science and NGOs in their extension programmes.

1.3 Extension Services in India – A Review of Literature

Agricultural extension services in the country have reported to be demand driven, participatory and decentralized in which accountability is geared toward the users (Birner et al., 2006; Biurner and Anderson, 2007; Davis 2008; Hall et al., 2000; Kokate et al., 2009; Sulaiman and Hall, 2008; Swanson, 2009). Country's five year planning emphasized the role of agricultural extension services in increasing agricultural growth. The five year plans emphasized the need for strengthening the agricultural extension in the country.

Despite the acceptance of and investment in agricultural extension in the country, the coverage of these services is still not appropriate. A number of studies are being conducted on extension services which indicate that the extension services require a complete overhaul. The NSSO survey (2003) indicated that 60% farmers had no access to any source of information on new farming technology. Among the farmers who had accessibility, 16% got it from progressive farmers and input dealers (NSSO, 2005). The relevance of the information provided to the extension services was also in question. There are multiple sources of information flow to the farmers including progressive farmers, input dealers, print and electronic media and extension workers. The study by Adhiguru, Birthal, and Ganesh Kumar (2009) indicates that small farmers had to depend upon progressive farmers, input dealers and radio for information. Contact with extension workers for medium size and large scale farmers was almost double that of small holding farmers. Sulaiman's et al work on agricultural extension suggests that extension services should be strengthened. The work examines the processes and structures inherent in the organizations that provide extension (Sulaiman and Holt, 2002; Sulaiman and Hall, 2002; Sulaiman, 2003a; Sulaiman and van den Ban, 2003; Sulaiman, 2003b; Sulaiman and Hall, 2008). A review of agricultural extension in India by Claire et al. (2010) brings out that extension services in India need to evolve to provide a diverse set of services and outreach to marginal and small farmers.

Extension services should respond to emerging issues in agriculture. The research by Venkatesh and Nithyashree (2014) examines the inputs used in agriculture and its accessibility. The results indicate that while input use had expanded in the second half of the 2000s, the role of private sector was more visible in supplying inputs like seeds, fertilizers and pesticides etc. The findings also suggest that inclusion of small and marginal farmers under institutional credit coverage and special attention of extension system to reach the unreached farmers are necessary. Impact study of KVKs on beneficiaries of Tamil Nadu and Puducherry by Subburaj (2013) covers six KVKs and 3,000 beneficiaries. The study reveals that while services provided by KVKs were useful to the beneficiaries, there was a need for frequent visits by the KVK staff to the field level. About 16.8% beneficiaries stated that KVK staff needs up-gradation of their technical knowledge for providing guidance on various problems faced by the farmers.

Various studies have brought out the efficacy of extension services in the country. The situations in agriculture sector are fast changing. The technology in agriculture is evolving. Is this new knowledge being implemented at grass root level and are farmers accepting the same? If yes, then what is the impact in terms of increased productivity in agriculture, increased incomes of farmers resulting in better quality of life? Is the development sustainable? How much time it takes to transfer the technology? What else is needed to make KVKs more effective? These are some of the questions that need to be addressed. It is also to be seen that, if new

practices are not being adopted by the farmers then what are the reasons for that? Once the reasons are identified, remedial measures could be taken up.

Keeping the above issues in focus, the Indian Council for Agricultural Research (ICAR) has awarded this study namely "KVKs' impact on Dissemination of Improved Practices and Technologies" to the National Institute of Labour Economics Research and Development (NILERD, formerly IAMR).

Chapter 2

The Present Study

A number of new technologies are coming up in the field of agriculture and allied sectors. Farming has been mechanized, new varieties of seeds are being invented, and new varieties of crops are coming up suitable to various regions of the country. Are these changes known at farmers' levels? Are farmers inclined to accept new inventions? Are these changes becoming accessible to farmers and helping them in any way? These are some of the questions that the present study explores.

2.1 Objectives of the Study

The present study aims at:

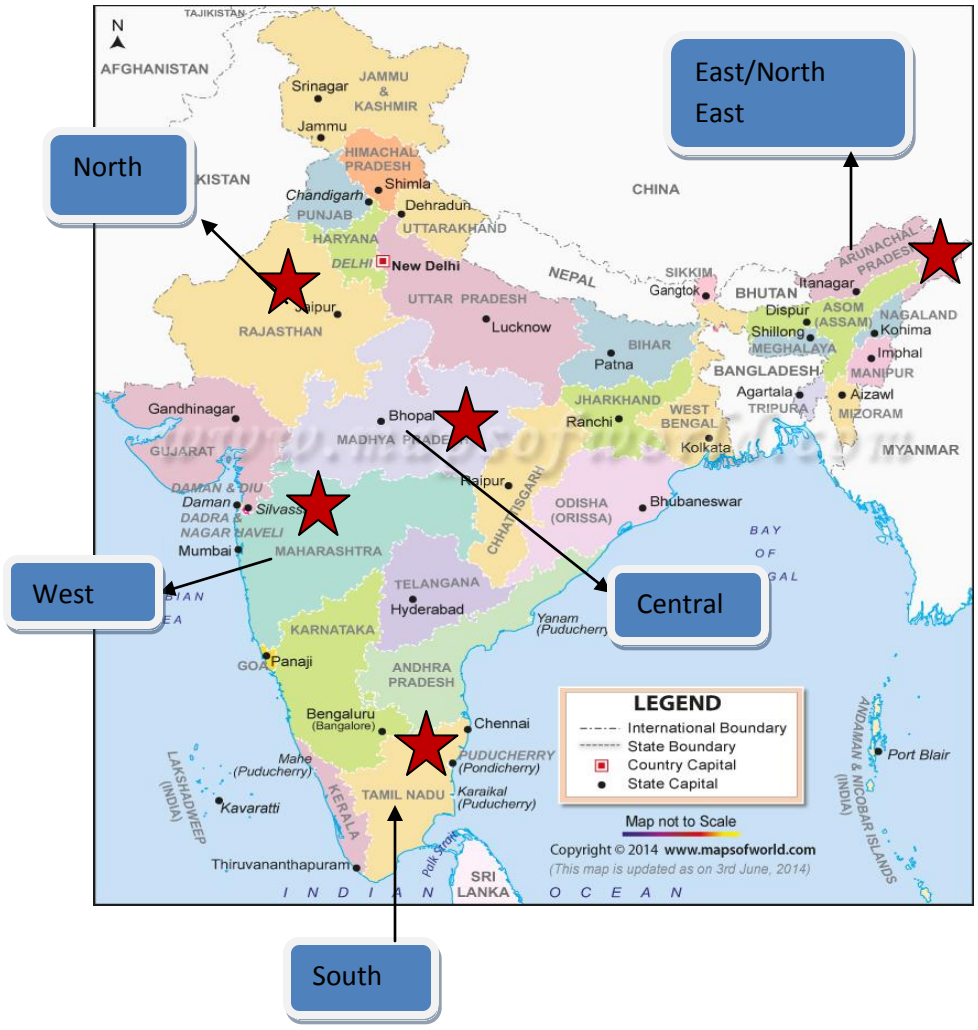
- Studying the efficacy of KVKs' services, both in public and private KVKs
- Assessing KVKs in terms of infrastructure and human resource
- Assessing the impact of new knowledge and practices on farmers' farming practices
- Assessing the impact of new knowledge adoption by farmers on their incomes and improved quality of life

2.2 Methodology, Tools and Approach

The study has been conducted on the basis of secondary as well as primary sources of data. The secondary sources include information from various published reports and data, earlier studies conducted and other material. Primary sources data includes primary survey of the sampled KVKs and farmers. Primary survey has been organized on the basis of structured questionnaires covering all the above objectives. To substantiate the survey data, focus group discussions (FGDs) with various stakeholders such as experts, scientists and other officials of Government and community organizations, farmers and their family members have been conducted.

2.2.1 Sampling

Stratified random sampling has been used to collect primary data. The country has been divided into five regions: North, South, Central, West, East/North East. One state from each region has been selected on the basis of random sampling. The coverage is as follows:



As seen in the above map, Tamil Nadu from Southern region, Rajasthan from Northern region, Madhya Pradesh from Central region, Maharashtra from Western region and Arunachal Pradesh from East and North Eastern region have been selected. The selected five states fall under III, V, VI, VII, and VIII agricultural zones.

From each state, a sample of 10 KVKs has been selected on random basis after distributing the total sample of 10 among Government, SAUs and other KVKs approximately proportionately ensuring that all types of KVKs are covered. In Arunachal Pradesh the number of KVKs is small (only 13) and that too all Government KVKs. Therefore, it is felt that about 50% sample (6 KVKs) would be sufficient.

On the above criteria, the following KVK districts have been chosen on simple random basis (Some of the KVKs selected had to be replaced on suggestions of Zonal officers due to some unavoidable reasons. However, replacement does not change the characteristics of KVK on which the earlier one was selected). The sampled KVKs can be seen in Table 2.1.

Table 2.1: State-wise Sampled KVKs

State	Total KVKs	No. of Selected KVKs	Name of Selected Districts
1. Rajasthan (North Region)			
Government	2	1	Jodhpur
SAUs and Other Universities	14	6	Sri Ganganagar, Bharatpur, Jaisalmer, Kota, Banswara, Chittorgarh
Other - NGOs	6	3	Udaipur, Jaipur, Barmer
2. Madhya Pradesh (Central Region)			
Government	1	1	Bhopal
SAUs and Other Universities	39	7	Gwalior, Hoshangabad, Umaria, Shivpuri, Chhindwara, Jabalpur, Katni
Other - NGOs	7	2	Satna, Ratlam
3. Maharashtra (West Region)			
Government	1	1	Nagpur
SAUs and Other Universities	17	4	Aurangabad, Ratnagiri, Wardha, Amravati replaced by Dhule
Other - NGOs	26	5	Nasik replaced by Ahmednagar , Akola, Parbhani, Kolhapur, Pune (Baramati)
4. Tamil Nadu (South Region)			
Government	-	-	-
SAUs and Other Universities	19	6	Dindigul, Madurai, Kanyakumari, Salem, Kanchipuram, Ariyalur replaced by Perambalur
Other - NGOs	11	4	Thanjavur replaced by Tuticorin, Nilgiris, Coimbatore, Thiruneiveli replaced by Erode
5. Arunachal Pradesh (East/ North-East Region)			
Government	13	6	Lohit, Pasighat, Upper Subansiri, Papumpare, West Kameng, Tewang
SAUs and Other Universities	-	-	
Other - NGOs	-	-	
Total Selected Districts		**46**	

Thus, a total of 46 KVK districts have been sampled for primary investigation.

- Fifty farmers from each selected KVKs district have been interviewed. To see specifically the impact of KVKs, two groups of farmers – one the controlled group and other the intervention group – has been formed. The controlled groups comprised of those farmers who have not received KVKs services. Intervention groups are those farmers who have been provided services by KVKs. The groups have been matched on the basis of size of landholdings, education and age. Thus, about 2,000 farmers have been covered under investigation. To see the impact of various KVKs under Government, private and universities, farmers have been selected separately receiving services from these three organizations in order to provide a comparison of effectiveness of services of KVKs under varying administration.

  Here, it is important to mention that although efforts have been made to select a controlled group but practically it was almost impossible to select the farmers' group who are totally unaware of the new technologies or development in agriculture. A number of NGOs are functioning at field level besides state Government officials who interact with farmers from time to time even if KVK is not providing services in a particular area. It has also been seen that there is a spillover effect and farmers learn from fellow farmers and also through media. Industry personnel also contact farmers for selling their products like fertilisers, new variety of seeds etc. In this scenario it is difficult to assess the attribution of KVKs. The impacts can be assessed in terms of 'contribution' only.

- To get an in-depth qualitative information to fill in the gaps in data collection through questionnaires, Focus Group Discussions (FGDs) in each sampled KVK district have been organized involving various stakeholders such as KVK officials, farmers, farmers' associations, other experts, NGOs etc. The group discussions have been organized in KVKs inviting local stakeholders and also stakeholders of various other villages. More than 100 such discussions have been organized at various levels. This has helped in culling out specific contribution of KVKs or lack of it.

2.2.2 Tools for Data Collection:

To collect primary data from KVKs and farmers, the following tools were developed.

i. Questionnaire for KVKs
ii. Interview Schedule for farmers
iii. Focus Group Discussion points

These tools were finalized following two steps. Tools were pre-tested in Bharatpur districts of Rajasthan and revised as per the feedback as a first step. The revised tools were sent to the Advisory Committee constituted by the Extension division of ICAR for their observation and advice. The comments were received from two experts, which were

incorporated in the data collection tools. On advice of KVK Shivpuri, farmer's interview schedule was translated in Hindi language. After vetting, the same was canvassed across the districts in Hindi belt.

- ***Indicators of study/assessment (List is indicative)***

(a) Assessment of KVKs

- Availability of infrastructure with KVKs
- Human resource available and quality of human resource
- Budget available with KVKs
- Functional areas of KVKs (both in agriculture and veterinary) and their efficacy
- Type of programmes, their duration and outreach
- Mechanism of technology transfer from Lab to KVK and field
- Follow-up activities
- Impact Assessment, if any
- Time taken for transfer of technology from lab to land.
- Training/demonstration in KVK premises/door-steps of farmers.
- Number of farmers implementing technology after KVK training/demonstration
- Challenges in transfer of technology.

(b) Assessment of Impact of KVKs on farmers through farmer interview schedule

- Farming practices of farmers and change
- New technologies and their dissemination to farmers
- Change in practices – when, how, and the result
- Success/failure stories and their spillover effect
- Increase in productivity
- Increase in quality of produce
- Reduction in cost of production, time, drudgery etc.
- Increase in incomes due to new practices
- Change in Quality of life in terms of expenditure on health-care, schooling, eating habits etc.
- Change in practices due to training
- Change in practices due to frontline demonstrations
- Change in practices due to any other intervention (please indicate).

Regular interaction has had with extension division of ICAR for day-to-day activities, consultation, cooperation and outreach.

2.2.3 Approach

A comprehensive and multi-faceted approach has been designed for the project which conforms to the purpose and objective of the project and which is informed by inputs provided by key stakeholders and preliminary field work organized during the field investigation. The approach involved a mix of quantitative methods such as surveys and qualitative techniques such as FGDs, the Most Significant Change technique as mentioned above. Final conclusions have been drawn through triangulation of results from multiple lines and levels of evidence.

The overall approach to the project had been multi-pronged as detailed below:

2.2.3.1Approach Focused upon Utility

The project has been designed to correspond to the needs of the end users. The project team's understanding about the intended use of the evaluation was based on the Terms of Reference TORs, the proposal submitted and discussed at various levels and consultations with experts and identified users of the project.

2.2.3.2 Approach Focused Upon Theory and Conceptual Framework

The project team, through a participatory process, attempted to work in the theoretical and conceptual framework of mandated activities of KVKs in transfer of technology and impact evaluation. The study has taken into account theory of change (TOC) for impact assessment.

2.2.3.3 Approach Focused upon Gender Equality

In order to meet the global and national principles, concerns and guidelines for Integrating Gender Equality, a gender-responsive approach has been followed throughout the study. The approach has been integrated into the design and implementation of the project. Gender sensitive indicators have been identified and included in design, approach and find a place in the final product of the project. Teams of survey included female officers and investigators and data have been collected both from male and female farmers.

Chapter 3

Assessing Impacts- Methodologies, Problems and Issues

3.1 Impact Evaluation

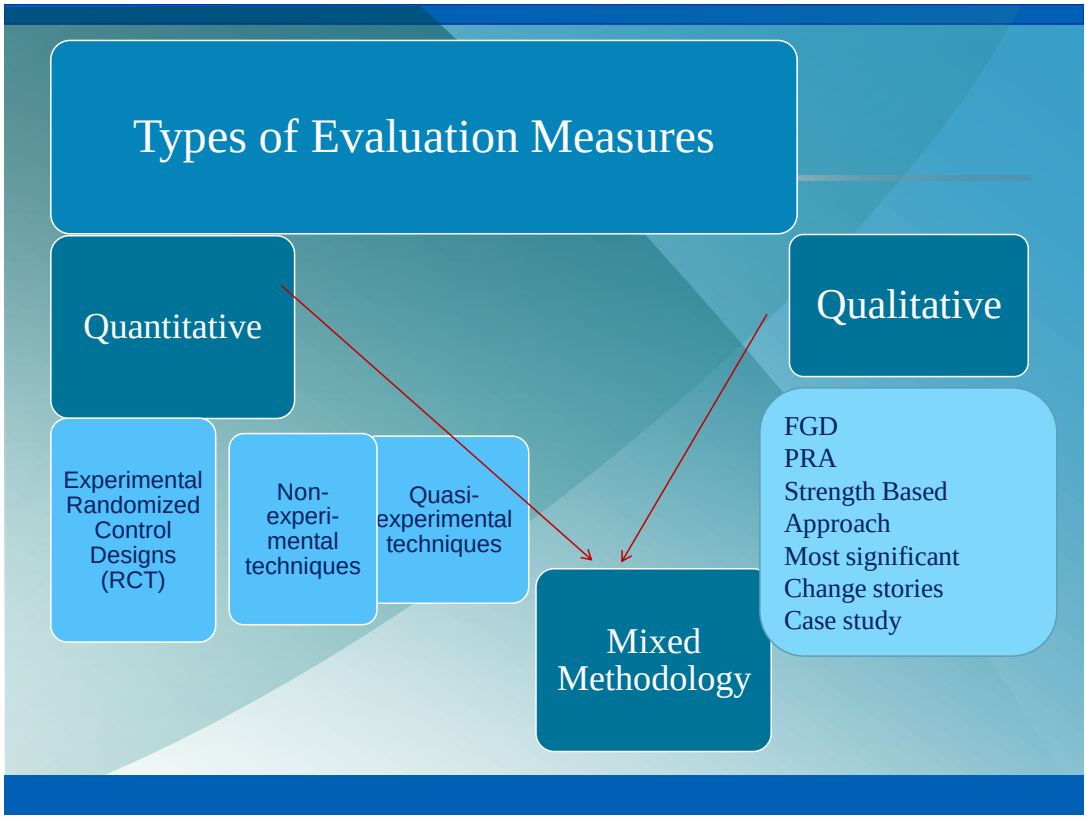
In the traditional approach, evaluation of development interventions used to be done primarily in terms of inputs outputs. If we follow the logic frame work, these are relatively easy to measure for a developmental intervention, and generally, the results are measured in terms of expenditure incurred or numbers (of e.g. beneficiaries) covered *vis-a-vis* targets. In recent decades, this approach has yielded place to the more comprehensive assessment of outcomes and impacts in relation to much broader objectives. The term 'impact evaluation' is also referred to by various nomenclatures such as outcome mapping, economic and social accountability, result based evaluations, etc. Though not always synonymous, all these have the common thread of measuring the 'impact' of the policy, programme or project in relation to the rationale of these interventions. Impact evaluation is complex in its definition as well as process.

Impact evaluation attempts to assess the changes that can be attributed to a particular intervention, such as a project, program or policy. These changes can be those intended or expected and also the unintended ones. In contrast to outcome monitoring, which examines whether targets have been achieved, impact evaluation is structured to answer the bigger question: has there been any change in the situation which the intervention was planned to correct and how has the intervention impacted the lives of the intended beneficiaries? This involves counterfactual analysis, that is, a comparison between what actually happened and what would have happened in the absence of the intervention. The key challenge in impact evaluation is that the counterfactual cannot be directly observed and must be approximated with reference to a comparison group. Impact evaluations seek to answer cause-and-effect questions. In other words, they look for the changes in outcome (s) that are directly attributable to a program. Such analysis helps in evidence-based policy decisions and understanding what works, what doesn't, where, why and at how much cost? The impact evaluations go for in-depth analyses of the process of impacting as well. This has received increasing attention as aids to policy making in recent years in both developed and developing country contexts. It is an important component of the armory of evaluation tools and approaches and integral to global efforts to improve the effectiveness of aid delivery and public spending more generally in improving living standards. Impact evaluations are now being increasingly applied in social sector investments in education, health and employment as well as in industrial sectors like agriculture, energy, transport etc.

As in all research, there are two categories of methodologies available to measure impacts – quantitative and qualitative. Both these broad categories have a wide variety of

specific evaluation designs. The following diagram provides a bird's eye view of various methodologies available for impact evaluations.

Fig 3.1 Methodologies of Impact Evaluation

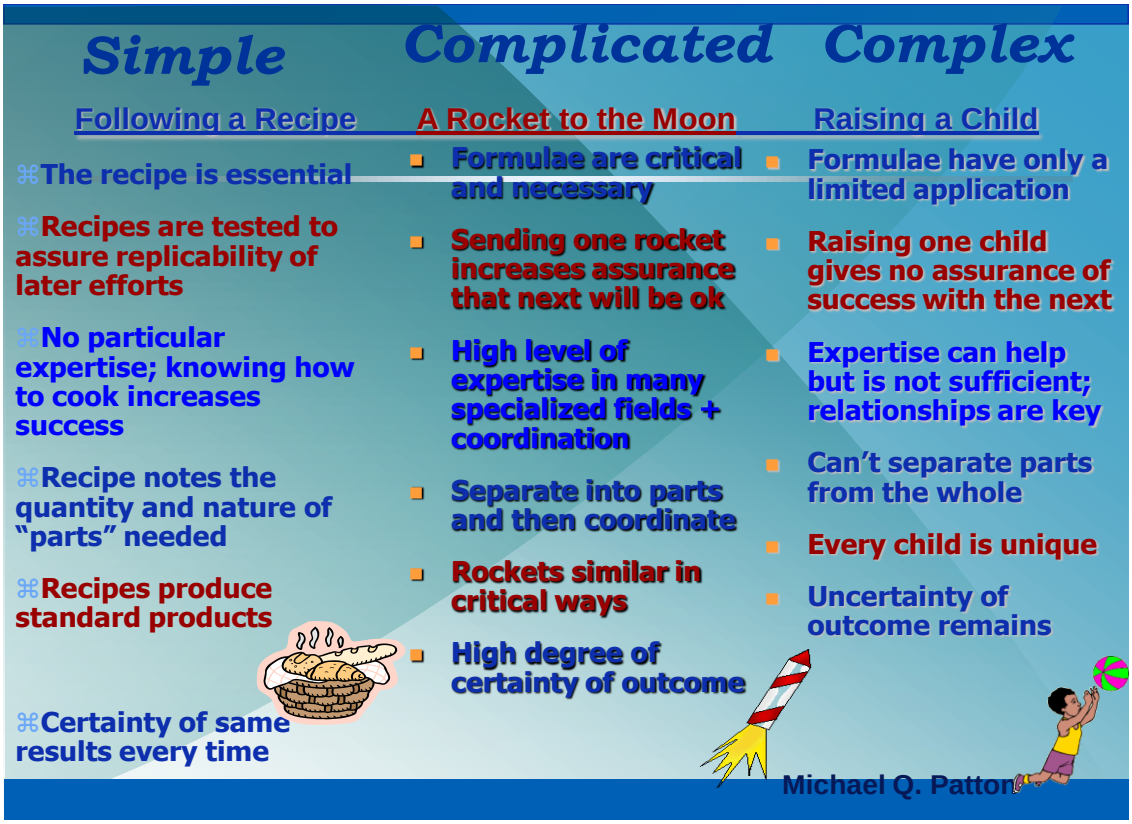


Each of the above mentioned designs have their own strengths and weaknesses and raise applicability issues in varying contexts. A brief discussion of the available methodological options will set the methodology adopted for the present study and its rationale in the right perspective. It would explain why any other evaluation design was not found feasible in the context of the present study.

In theory it is perfectly logical and rational to link resource allocation and utilization to results and judge performance solely in terms of the latter. In practical application of this unexceptionable principle, however, certain issues – theoretical and practical – do arise that need to be addressed. With the emergence of evaluation as a full-fledged discipline, its concepts, approaches and methodologies have undergone constant refinements and innovations in response to theoretical debates and practical problems, resulting in a large choice of methods of evaluation, both quantitative and qualitative, each with their strengths and weaknesses. Patton distinguishes between simple, complicated and complex interventions and their evaluations and argues that measurement of results or impact will vary on the position of the intervention in this scale of complexity (Patton, 2006). While simple interventions with clearly specified goals may

lead to same specific results if such interventions are repeated, the complicated and complex interventions may lack certainty of impacts especially when results are expected in terms of attitudinal change or behavioral modifications. The figure will explain this phenomenon:

Fig. 3.2 Simple to Complex Evaluations



There are primarily three basic types of quantitative designs available – the experimental designs or the randomized control trials (RCTs), the quasi-experimental designs and the non-experimental designs. The following sections outline the broad features of each of these designs with primary focus on their relative applicability in varying situations, with particular reference to the present study.

3.2 Experimental designs

There is intense debate in academic circles around the appropriate methodologies for impact evaluation between proponents of experimental methods on the one hand and proponents of more general methodologies on the other. The school of thought which believes in pure scientific method of impact evaluations calls for experimental methods. Proponents of experimental designs, sometimes referred to as 'randomists', argue that randomization is the only

means to avoid bias in selection of intervention group and the control group, makes the two groups equally exposed (on an average) to factors other than treatment itself and makes the comparison between the two groups valid and amenable to generalizations. Others argue that randomized assignment is seldom appropriate to development interventions and even when it is, experiments provide us with information on the results of a specific intervention applied to a specific context, and little of external relevance. There is criticism that some donors and academicians over-emphasize experimental methods for impact evaluation, and that this may in fact hinder learning and accountability.

While experimental designs (or Randomised Control Trails (RCTs)) are considered most rigorous designs avoiding all selection biases, they are difficult to apply in practice, particularly where the beneficiaries are human beings. One of the major pre-requisites for adopting this design is that the need for evaluation should be visualized and provided for at the planning stage itself and before the beginning of the intervention, because treatment and control groups have to be selected randomly before the intervention is made. Any selection of a comparison group *at a subsequent stage,* however statistically sophisticated be the methods of selection, will not make it eligible to be called an RCT. Moreover, selection of a control group, whose members would be denied the benefits of the programme, raises issues of ethics when dealing with human beings. RCTs also cannot be used to evaluate programmes of universal applicability as the intervention benefits all and a control group cannot be formed. Only in cases of formative evaluations when the programme details are being developed, there are possibilities to use experimental designs.

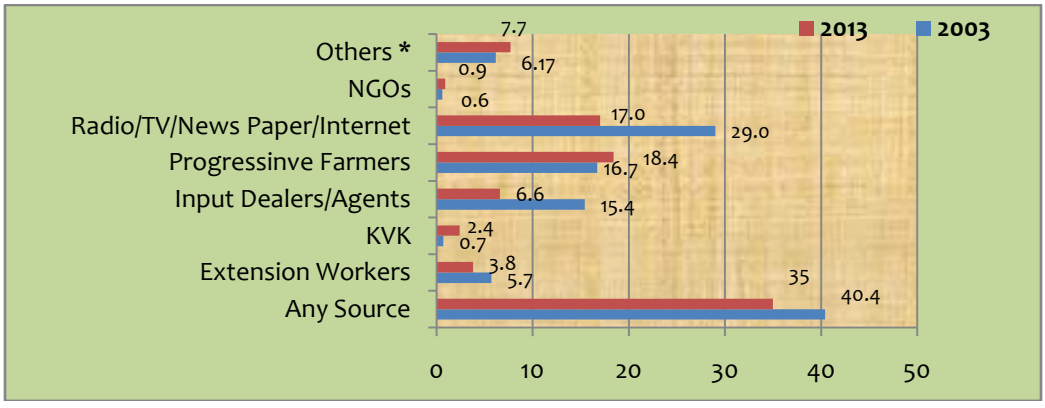
The circumstances in which the present evaluation has been conceived preclude the application of a randomized control design. The KVK programme has already been in operation for several years and now in practically every district. As such, it is not possible to apply this type of design in the present study. Firstly, this evaluation was not conceived before the KVK programme started and was not a part of the planning stage. KVKs are already there and are making interventions without having first created any control and treatment groups. Secondly, the interventions by KVKs have practically universal application in as much as almost every district is covered by KVK activity. Even for farmers in villages in any district it is difficult to identify those totally precluded from the influence of the knowledge transmitted by KVKs as that knowledge flows through several channels. Even if a farmer has not attended any KVK programme, he learns about the technology from mass communication media, operations of NGOs, district agriculture department officials, and most importantly from fellow farmers. This is another reason why RCT is not suitable for this study. Since the KVKs are virtually in all districts, "pipe-line" technique for randomization was also not possible.

3.3 Quasi-experimental designs

The second best design after RCT is one that employs a quasi-experimental technique, which uses a comparison group instead of control group for a counterfactual. This is a commonly used technique for measuring impacts where RCTs are not possible. In this technique, a comparison group is constituted to match the treatment group and the differential performances of the two groups are measured and compared. The matching of the two groups is done on the basis of various variables which are considered to affect the impact so that the two groups are as comparable as possible in respect of the factors selected and the differences in performance can be reasonably attributed to the treatment alone. One of the advantages of this approach is that the groups can be formed after the intervention and impacts measured although in less precise manner. This technique was considered for application in the present study to measure impact. Selection of two groups of districts with comparable attributes with and without KVK activities was not possible as all the districts have KVKs.

An alternative is to identify villages in each district a) to which the influence of KVKs has not percolated as non-intervention villages and b) villages which are influenced by KVKs as intervention villages, and selecting samples of farmers from intervention villages and from non-intervention villages in each district matching them on various factors. Farmers from non-intervention villages would be the comparison group. Matching was proposed on the basis of the variables like education, size of land holding and distance from KVK. However, while selecting the samples at field level, problems were faced in selection of comparison group as discussed in the previous chapter. The objectives of the present study relate to assessing the impact of transfer of technology to the farmers by KVKs. Technology transfer activity is being performed by a number of other organizations as well. Adhiguru et al (2009) in their study provided the information on sources of transfer of technology. NSSO data also indicates about various sources of information to the farmers as given in Fig 3.3.

Fig. 3.3: Information source on modern technology to farmers



* includes, Agriculture Universities/Colleges, Para-technicians, Veterinary Departments, Credit agency
Source: NSSO Report No. 499 (59/33/2) -2005 and NSS KI 70/33, 2014

Other researchers have also indicated about the knowledge flow from research to field and stated that there are a more than one actors in this process. Clark, Smith and Hirvonen (2007) were of the view that the interactions of a network of agents, including those associated with scientific research, determine the innovative impact of knowledge interventions. This was found true in case of the present study as well. The technical knowledge is being disseminated to farmers, besides by KVKs, by a number of other knowledge agents that include Government departments, non- Governmental organizations, industries, input dealers, progressive farmers, other fellow farmers, self-innovations, print and electronic media and discussions at various community and other platforms. These channels are not mutually exclusive and many a time more than one operates. Further, the technology knowledge from KVKs flows to the farmer not only directly through training, demonstrations and other KVK activities, but often indirectly through other channels like district officials and NGOs. As such, no non-intervention villages which were totally insulated from KVK influence could be located where farmers were not aware of the new technologies. In fact, some villages with limited KVK intervention which could have possibly been considered as non-intervention villages were much more modernised as compared to intervention villages. Hence, having a comparison group in its true sense was not possible and it was very hard to isolate the impacts on transfer of technology that could be attributed specifically to KVKs. However efforts have been made.

3.4 Non-experimental designs

The weakest of quantitative methodologies is the non-experimental design because there is neither any control group as is in RCT nor any comparison group as is in quasi experimental technique. The impact is measured only by the change after intervention in the programme beneficiaries. This technique has been used in India for a number of impact evaluations in the past and can be useful for the programmes that have universal applicability. These evaluations did not have any counterfactual to tell what would have happened if such initiatives were not been taken. Further, results based on this technique cannot be generalized. This method has been adapted and adopted in the present evaluation of KVKs since the activities of KVKs have universal applicability. Trends in technology over the years have been observed and farmers have asked the change that has taken place over the years.

3.5 Qualitative designs

Quantitative techniques discussed above have their weaknesses. They have limited flexibility and are unable to peer into the 'black box' though they give an overall dimension of the impact. Questions like why the intervention works or does not work, how it works, etc., are not easily answered by quantitative methods. It is said that not everything that counts can be counted. Impacts that relate to change in behaviors, attitudes and thinking cannot be counted in numbers. A lot of information is lost in numbers. (Agrawal, 2015). Qualitative techniques tackle

these issues, and their use in impact evaluations is finding increasingly large advocates. A number of qualitative techniques are being used suiting to various types of situations, evaluation questions and types of evaluations. Some of these techniques include Focus Group Discussions, Participatory Rural Appraisal, Strength Based Approach, Collaborative Outcome Report Technique (CORT), Positive Deviance Method, Most Significant Change Stories, Case Studies and so on. More and more qualitative techniques are evolving as in most of the cases impact is being measured in terms of change in behaviors. These techniques at field level start evaluation with a positive approach and concentrate on strengths of the people to adapt to situations and the positive changes that are taking place due to certain intervention thus reducing the fear factor which is associated with evaluation. A fault finding approach is avoided in applying these techniques. Most of the qualitative techniques provide collective opinion resulting in original and natural solutions. These techniques also accelerate women's participation and take into account 'inside the wheel approach' (Agrawal, 2015). In the present study of impact of KVKs, a combination of the qualitative techniques has been used. These include focus group discussions, most significant change stories, observations and case studies.

It can be observed from the above discussion that for impact evaluation of KVKs a mixed methodology approach has been adopted. 'A thorough impact evaluation begins with choosing the right evaluation methodology and this usually involves some tradeoffs' (Asian Development Bank,2006).The Independent Evaluation Group (IEG) of the World Bank opines that a mixed approach of both the categories produces the strongest evaluation findings. Bamberger (2013) cites a number of potential benefits of quant-qual mixed methods approach which *inter alia* include:

- Availability of a broad range of techniques and conceptual frameworks at all stages of evaluations.
- Inclusion of professionals from different disciplines in the evaluation process
- Understanding of how contextual factors influence implementation and outcomes at local level.

The combination of Quant-Qual method has been found beneficial in bringing out focused results for the present study. This has combined the strengths of both types of approaches and taken care of weaknesses of each type of approach. Besides, a conceptual framework has also been developed in terms of theory of change.

3.6 Theory of Change (TOC)

To assess the impact of KVKs on farmers a theory of change has been devised (Figure 3.4). It will help to understand the process of change that is expected to lead to the observed impacts, validate the results and provide a conceptual framework for analysis. The objectives and expected uses of this conceptual framework within the evaluation are the following:

- To provide a basis to assess the efficacy of approach of transfer of technology to farmers

- To help 'bring-together' and summarize results of transfer of technology by KVKs
- To help understand the inherent assumptions made by KVKs (so that they can be tested through case studies).

This TOC is summative in nature, as it provides a backward looking summary of the overarching intervention logic of KVKs assignments. It is also meant to capture all the complexity of KVKs and farmers' understanding and thinking about transfer of technology.

One of the KVK's priorities has been that the poorest and most vulnerable are economically empowered and benefit from technology transfer, and that gap in access to innovative technology in agriculture between women and men, the rich and the poor will narrow down. The underlying TOC is depicted in Fig. 3.4.

Fig. 3.4: Theory of Change

Inputs	Activity	Outputs	Outcome	Impact
• Experts with technical knowledge in various agro-related fields. • Expert trainers • Infrastructural support • Agri input support • New & emerging technologies	• Need Assessment at farmers level about technology • FLD • Training of farmers as per local needs • Input support on pilot basis • Knowledge generation and circulation. •Dialogue and coordination •Capacity and skill development and awareness generation	• FLD organised • Own farm development for display training as per need • New Technology transferred • Monitoring sand feedback on technology transfer • Advice to farmers • Mentoring • Collaboration with other departments	• Adoption of technology by farmers •Optimal use of resources •Enhanced technical knowledge •Spillover effect of new technology •Empowerment of women and other groups •Enhanced job opportunities	• Increase in Productivity in agriculture • Drudgery reduction • Increase in incomes • Inclusion of small farmers and women and other vulnerable groups • Mechanization of agriculture • Evidence based development of agriculture •Sustainable growth • Better quality of life in villages

The above formulation of theory of change provides a conceptual framework establishing a logical sequential chain of change which has been postulated to occur as a result of the intervention. This chain of events follows a sequence of 'if' and 'then'. This indicates that the next set of activities will depend on the occurrence of a previous set of events. If the inputs are

available on time then only the activities indicated will be performed. Resources can be in terms of knowledge, availability of trainers, money, time and human resource, adequate infrastructure and so on. On the basis of timely availability of these resources various activities can be performed. Outputs would depend upon the specific activities leading to outcome and long term impacts. Here it is important to mention that this theory of change is depicted in its simplest form. It can be complex when more extraneous (intervening) variables affect the chain of events. For instance, the KVK intervention may not lead to the perceived impact if there is a drought or floods or any other calamity. Similarly, if the advice given is not as per appropriate time, it may not lead to the desired results. There are also possibilities that resources are not easily accessible. Another issue is that while input to output process is amenable to monitoring activity and can be directly measured, outcome and impact relate to evaluation and may not be directly measured. Impacts here can be only contributory. Thus there are certain assumptions in the TOC that would lead to the final impact. These are as under:

Assumptions:

- Timely availability of resources with KVKs
- Active participation of target groups in various activities
- Willingness to use new knowledge and skills
- Resources with farmers to use new technology
- Support services accessible
- Supportive Social norms and Traditions

It may be seen here that theory based impact evaluation relates to mapping out the causal chain from inputs to impact and validates the assumptions and risks at field level that will lead to impact. A theory based approach helps in understanding the reasons for differing levels of programme participation and the processes that determine the behavior change. White (2009) points out the importance of application of a theory based approach to impact evaluation as a means to understand the policy relevance of impact evaluations. He has given six key principles of the theory based approach of impact evaluation, these are:

- Map out the causal chain (program theory) which explains how the intervention is expected to lead to the intended outcomes, and collect data to test the underlying assumptions of the causal links.
- Understand context, including the social, political and economic setting of the intervention.

- Anticipate heterogeneity to help in identifying sub-groups and adjusting the sample size to account for the levels of disaggregation to be used in the analysis.
- Rigorous evaluation of impact using a credible counterfactual (as discussed above).
- Rigorous factual analysis of links in the causal chain.
- Use mixed methods (a combination of quantitative and qualitative methods).

In the present study, various approaches and programme theory discussed above have been combined to get the optimum results of impact evaluation.

Chapter 4

Inputs from KVKs

4.1 Introduction

The first stop for an evaluation of the impact of KVK activities would naturally be the institutions themselves. As a part of the evaluation study informational inputs were sought from the 48individual KVKs covered regarding the resources available to them, their activities in relation to farmer education and technology transfer, constraints under which they functioned, their own assessment of the impact their activities had on the farmers and their suggestions for improved performance. This chapter is devoted to distilling this information. More detailed data tables can be seen in Annex 1.

4.2 KVKs covered – Some Basic Details

4.2.1 KVKs by controlling organization

In the five States covered there were a total of 176 KVKs (out of 642 in the entire country), of which a sample of 48 were taken up for study, comprising 12 in Rajasthan, 10 each in Madhya Pradesh, Maharashtra and Tamil Nadu, and 6 in Arunachal Pradesh. ICAR controlled four of them, five were under the State Governments, 24 were attached to the SAUs and the remaining 15 were run by NGOs. The choice of KVKs was made in consultation with Extension division of ICAR and the criteria mentioned in the Chapter of methodology. Table 4.1 gives the State-wise coverage by controlling organization.

Table 4.1: KVKs Covered by State and Controlling Organization

State	Controlling Organization				
	ICAR/ Governments	SAUs	NGOs	All	
				Total covered	Total in the State
Arunachal Pradesh	5	1	0	6	13
Madhya Pradesh	1	7	2	10	47
Rajasthan	0	10	2	12	42
Maharashtra	1	3	6	10	44
Tamil Nadu	2	3	5	10	30
ALL	9	24	15	48	176

4.2.2 Focus areas of KVKs

Almost all the selected KVKs reported that agricultural crops, horticulture and veterinary and animal sciences were the focus areas of their activities. Half of the KVKs also referred to fisheries sciences and forestry also as their focus. A few more (31) mentioned agricultural engineering also. (Table 4.2).

Table 4.2: Focus Areas of the Selected KVKs

Focus area	No. of selected KVKs of type which reported the focus area			
	ICAR/ Government	SAU	NGO	All
Agriculture	9	24	15	48
Horticulture	8	24	15	47
Veterinary & Animal Sciences	8	24	14	46
Fisheries	4	16	5	25
Forestry	4	16	6	26
Agricultural Engineering	5	17	9	31
Home Science	1	3	2	6
Post-Harvest Management	-	-	1	1
Plant Protection	-	3	4	7
Soil Science	-	1	1	2
Women's Empowerment	-	1	-	1
Agricultural Extension	3	-	-	3

4.3 Resources

4.3.1 Staff resources

Each KVK has certain sanctioned staff comprising scientists, technical support staff and other staff. Some of the other staff may be contractual. The scientists include a Programme Coordinator (PC) and 6 (4 in some KVKs) Subject Matter Specialists (SMS). In general the KVKs are short of staff at all levels – to the tune of over a quarter among Scientists (23%) and Technical Support staff (22%) and about 86 per cent among other staff (Table 4.3 (a)).

Table 4.3 (a): Staff Sanctioned, Staff in Position and Percentage of Vacancies in KVKs by Type of KVK

KVK Type	Scientists			Technical Support Staff			Others & Contractual Staff		
	Sanctioned	In Position	% vacant	Sanctioned	In Position	% vacant	Sanctioned	In Position	% vacant
ICAR/ Govt.	57	46	19.29	34	34	0.00	40	5	87.50
SAU	163	119	26.99	91	57	37.36	79	10	87.34
NGO	111	89	19.82	65	58	10.77	61	10	83.61
All	331	254	23.26	190	149	21.58	180	25	86.11

The shortages are irrespective of the organizations controlling the KVK; only the extent of shortage is higher among KVKs under state Governments and SAUs among scientists. Shortage of Technical Support Staff is particularly severe in KVKs under SAUs. Table 4.3 (b) indicates the State-wise position. In the case of Scientists, Tamil Nadu stands out with almost negligible percentage of vacancies. Arunachal Pradesh and Madhya Pradesh have almost full Technical Supporting Staff.

Table 4.3 (b): Percentage of Vacancies in KVKs by State

State	Scientists	Technical Support Staff	Others & Contractual Staff
Arunachal Pradesh	15.00	0.00	78.26
Madhya Pradesh	20.63	5.00	100.00
Rajasthan	34.48	46.67	97.14
Maharashtra	27.40	18.42	60.00
Tamil Nadu	1.64	12.90	100.00
All States	**23.26**	**21.58**	**86.11**

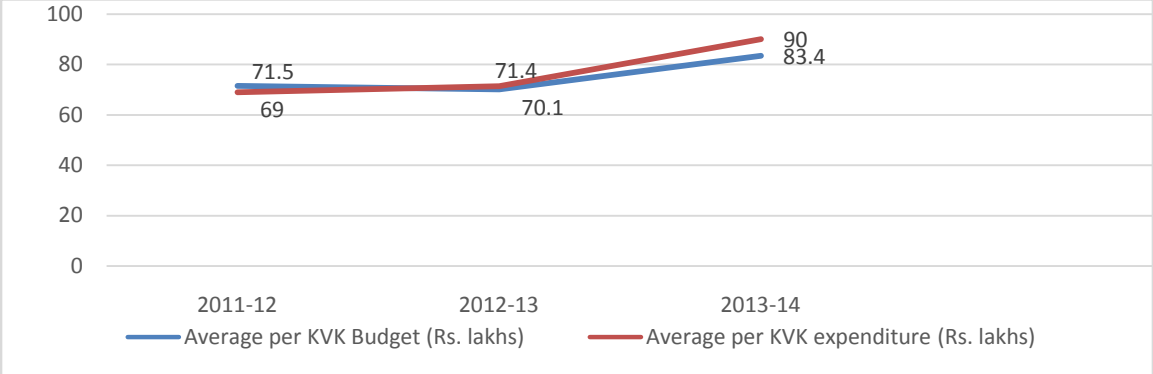
Overall, 19 of the 48 KVKs surveyed had the full complement of scientists. In a few KVKs like Jodhpur and Jaisalmer there were none or just one scientist.

The scourge of vacant posts appears to be common to the entire ICAR system, State Governments and SAUs due to the economy policies of the respective Governments. But it does tell upon the efficiency and impact of the activities of KVKs.

4.3.2 Financial Resources and Utilization

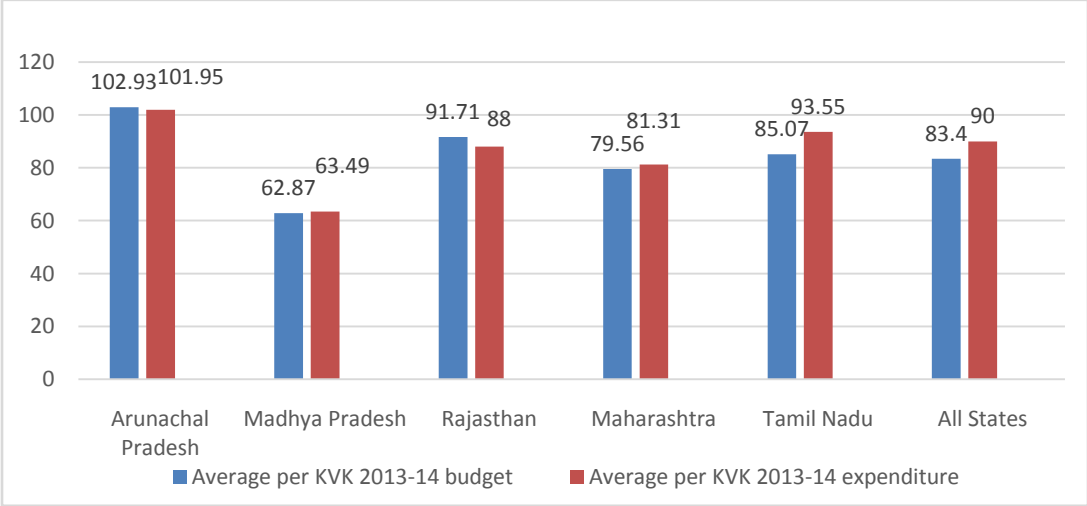
During 2013-14, the 48 KVKs had an average annual budget of Rs.83.4 lakhs and spent 90.0 lakhs achieving utilization percentage of 108.Figure 4.1 shows the changes from 2011-12 to 2013-14. The extent of utilization of budgetary resources was slightly below cent per cent in 2011-12 (96.5%) but improved to 101.9 per cent in 2012-13 and further to 108.0 per cent in 2013-14.

Figure 4.1 Average per KVK budget and expenditure 2011-12, 2012-13 1nd 2013-14



There were considerable variations in budget resources from KVK to KVK even in the same State. The budget varied from Rs.89.2 lakhs to Rs.109 Lakh in Arunachal Pradesh from Rs. 13.9 lakhs to Rs.102.2 lakhs in Madhya Pradesh, from Rs. 34 lakhs (excluding Jodhpur which showed a budget of Rs. nil) to Rs. 164.8 lakhs in Rajasthan, from Rs. 20 lakhs to130.3lakhs in Maharashtra and from Rs. 49.8 lakhs to Rs.97.9 lakhs in Tamil Nadu. Figure 4.2 shows the average per KVK budget and expenditure in 2013-14 for different States. KVKs in Madhya Pradesh had the lowest average budget and expenditure for 2013-14 and Arunachal Pradesh the highest.

Figure 4.2 Average per KVK budget and expenditure in different states in 2013-14 (Rs. Lakhs)



At the KVK level, the institutions in Arunachal Pradesh and Tamil Nadu fared the best. In Arunachal Pradesh, in 4 of the 6 selected KVKs the utilization of budgets exceeded 100 per cent over the three years 2011-14 and the remaining 2 achieved over 95 per cent utilization. In Tamil Nadu, 5 of the 10 KVKs exceeded 100 per cent in utilization (3 year average) while the remaining 5 achieved over 95 per cent. Out of the 10 KVKs in Madhya Pradesh, 3 KVKs exceeded the budgets, 5 used up 95 to 100 per cent of the resources, 1 achieved 90 to 95 per cent

while KVK Hoshangabad fared the worst with a utilization less than 75 per cent. In Rajasthan the utilization was relatively poor, with only one KVK exceeding 100 per cent, 6 using up 95 to 100 per cent, one (KVK Barmer) scoring 90 to 95 per cent but 3 (KVKs Pokharan, Jaisalmer and Shri Ganganagar) achieving only less than 75 per cent over the three-year period 2011-14 (KVK Jodhpur did not show any budget). Finally, in Maharashtra, 5 of the 10 selected KVKs could use only below 90 per cent of their budgets, two of them (Kolhapur and Aurangabad) scoring less than 75 per cent.

Organizationally, it would appear (Table 4.4) that the KVKs run by NGOs utilize their financial resources to the maximum extent with an average of 109.2 per cent. KVKs attached to SAUs too almost achieve full utilization (98.4%). SAUs under ICAR have a relatively lower percentage of resource use, though in absolute terms the achievement is quite good at 91.7 per cent. It may be remembered in this connection that the data for KVKs under ICAR and Government are based on a very small sample.

Table 4.4: Average Utilization of Budgets by KVKs (2011-14) by Type

KVK Type	Average percent of budget utilization by KVKs of the type during			
	2011-12	2012-13	2013-14	All years
ICAR/ Government	101.5	108.6	88.5	98.9
SAU	89.6	103.1	103.0	98.4
NGO	101.9	95.7	126.6	109.2
All	96.9	101.9	108.0	102.4

4.3.3 Infrastructure

The opinions of KVKs were ascertained regarding the adequacy or otherwise of various items of infrastructure that facilitate functioning of the administrative and technical activities of the institution. Table 4.5 (a) summarizes the opinions.

Table 4.5 (a): Adequacy or Otherwise of Infrastructure at the KVKs

Infrastructure type	No. of KVKs reporting				All
	Fully adequate	Partly adequate	Not adequate	Not reported	
Administrative building	34	8	4	2	48
Staff quarters	22	6	15	5	48
Hostels	26	4	15	3	48
Demonstration unit	23	13	7	5	48
Furniture	23	11	9	5	48
Office equipment	31	11	5	1	48
Electricity	33	11	-	4	48

Table 4.5 (b) Status of Infrastructure at KVKs by type of management

Infrastructure type	No. of KVKs reporting								
	Fully adequate			Partly adequate			Not adequate		
	ICAR/Govt.	SAU	NGO	ICAR/Govt.	SAU	NGO	ICAR/Govt.	SAU	NGO
Administrative building	6	16	12	2	4	2	0	3	1
Staff quarters	1	10	11	1	4	1	3	9	3
Hostels	2	12	12	1	1	2	4	10	1
Demonstration unit	3	12	8	3	5	5	1	5	1
Furniture	3	11	9	2	5	4	2	6	1
Office equipment	5	15	11	3	5	3	1	3	1
Electricity	6	16	11	1	7	3	0	0	0

The table 4.5 (b) indicates that in SAUs there is shortage of hostel and staff quarters facilities.

Table 4.5 (c) Availability of infrastructure at KVKs by states covered

Infrastructure type	No. of KVKs reporting by state														
	Fully adequate					Partly adequate					Not adequate				
	Ar. P	MH	MP	RN	TN	Ar. P	MH	MP	RN	TN	Ar. P	MH	MP	RN	TN
Administrative building	3	8	7	8	8	3	1	2	1	1	-	1	1	2	-
Staff quarters	-	5	7	5	5	1	-	1	3	1	3	4	2	4	2
Hostels	1	6	7	7	5	-	1	1	-	2	4	3	2	5	1
Demonstration unit	2	5	5	7	4	3	3	2	-	5	1	-	3	3	-
Furniture	1	6	3	5	7	2	2	3	2	3	2	1	3	2	-
Office equipment	3	8	5	8	6	3	2	3	3	1	-	-	2	1	2
Electricity	4	9	5	8	7	1	-	5	4	1	-	-	-	-	-

Generally the KVKs are fully or partly satisfied regarding the various infrastructure facilities. Exceptions are in respect of staff quarters and hostels. There are no great variations in this area between KVKs under different organizational control or by states.

4.4 Activities

4.4.1 Villages and farmers covered

One of the main mandated activities of KVKs is organizing front-line demonstrations of new agricultural technologies for the benefit of farmers. During the 5 years (2009-2014)

preceding this evaluation teams from the 48 KVKs selected had visited a total of 10,254 villages and covered 10.32 lakh villagers. On an average, therefore, each KVK covered 43 villages and 4,300 farmers annually. Both the number of villages covered and the number of farmers covered increased steadily over the five years 2009-10 to 2013-14, the former at a CAGR of 16.2 per cent and the latter at 10.3 per cent. As the number of KVKs selected remained constant at 48 through this 5-year period these trends are true of the per KVK performance also.

Table 4.6: No. of Villages and Farmers Covered by all the Selected KVKs (2009-10 to 2013-14)

Year	Villages visited	Farmers covered	Villages by each KVK	Farmers by each KVK
2009-10	1512	149787	31	3121
2010-11	1783	208037	37	4334
2011-12	1929	212067	40	4418
2012-13	2187	229716	46	4786
2013-14	2892	232396	60	4842
5-year average	2051	206399	43	4300
Annual growth rate (%)	16.2	10.3	16.2	10.3

The performance in regard to the level of annual coverage of villages and farmers and the growth in these numbers over the five years 2009-10 to 2013-14 was not uniform across KVKs under various managements. KVKs under NGO management had moved ahead much faster than the other types of institutions. Figures 4.3 and 4.4 throw up these variations.

Figure 4.3: Average No. of villages visited by each type of KVK

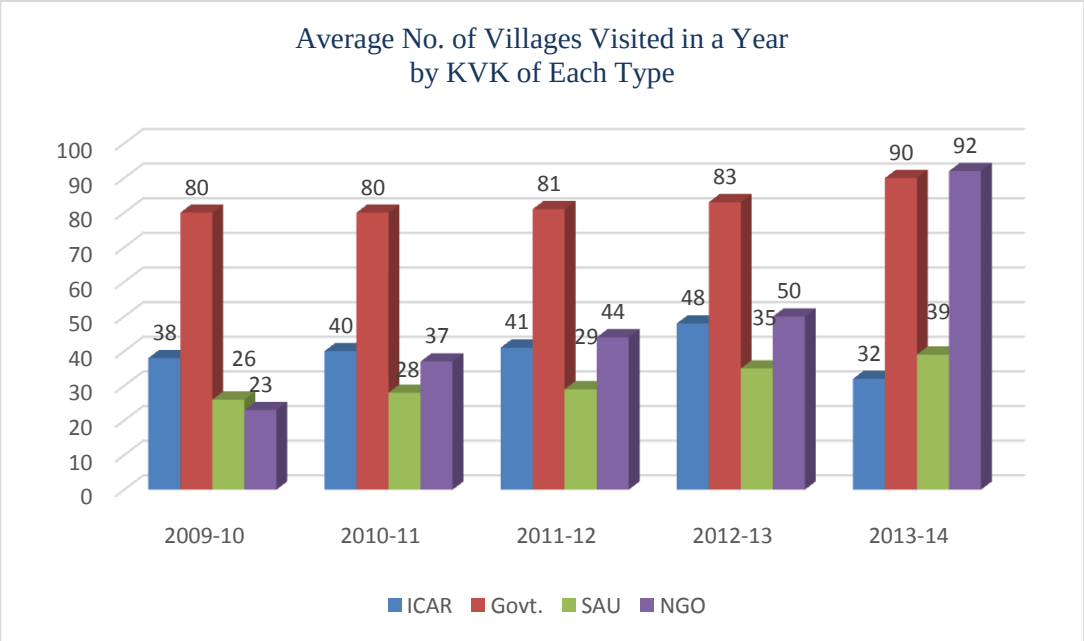


Figure 4.4 Average No. of farmers covered by a KVK of each type

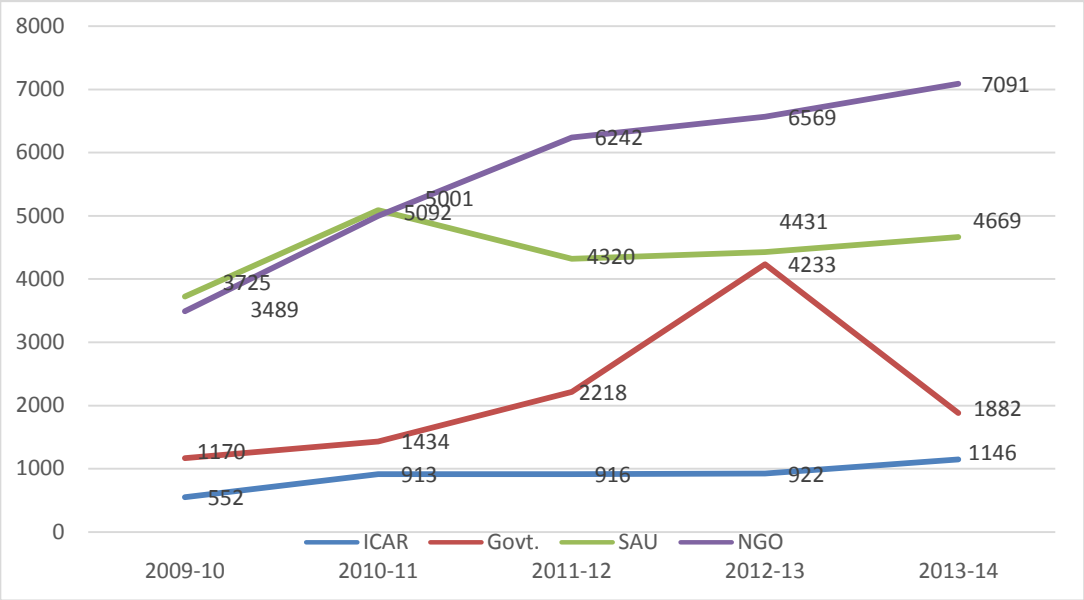


Table 4.7: No. of Villages and Farmers Covered by Selected KVKs in Different States (2009-10 to 2013-14)

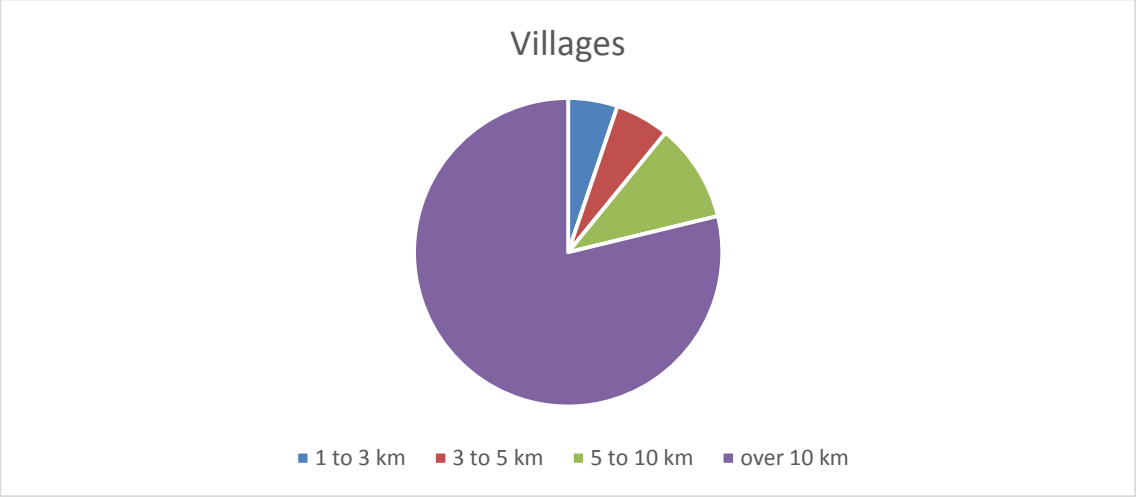
State	Total No. of Villages visited	Total No. of Farmers covered	Average No. of villages covered by each KVK annually	Average No. of Farmers covered by each KVK annually
Arunachal Pradesh	2,271	76,688	76	2,556
Madhya Pradesh	3,418	1,97,518	68	3,950
Rajasthan	1,405	2,92,652	23	4,878
Maharashtra	1,251	3,02,417	25	6,048
Tamil Nadu	1,909	1,62,722	38	3,254
All States	10,254	10,31,997	43	4,300

Table 4.7 indicates the performance of different States. On an average, each KVK in Arunachal Pradesh and Madhya Pradesh covered a substantially larger number of villages annually than the other three States. This higher coverage, however, did not translate itself into larger coverage of farmers.

About 80 percent of the villages covered were over 10 km away from the office of the KVK. Another 10 percent were within 5 to 10 km away (Figure 4.5). This is so irrespective of the type of KVKs. It is pertinent to mention here that KVKs are so located that it takes about 5 km. to reach to a nearby village. During the FGD it was brought out that due to resource crunch

most of the KVKs are catering to the needs of villages located in the vicinity. Some of them are covering area of about 30-40 k.ms. Beyond that most of the KVKs are delivering the services.

Figure 4.5 Distribution of villages covered by KVKs by distance from KVK



4.4.2 Specific activities of KVKs

Some of the main activities conducted by the KVKs include organizing front line demonstrations of new technologies, training programmes for farmers in the new technologies, programmes to generate awareness of the technologies, testing the technologies on the farm, etc. The frequency with which these activities are conducted and how they are conducted by the KVKs is summarized in Table 4.8 (a).

Table 4.8 (a) : Details of Specific Activities Conducted by each KVK (On an Average) Annually

Activity	No. of times the activity is conducted			
	Where Conducted		How Conducted	
	In KVK	In village/block	Individual	Groups
Front line Demonstration	2	109	46	1
Farmers Training	34	134	213	15
Technology Dissemination	12	5	365	3
On Farm trial	1	5	12	1
Awareness Programmes	7	27	284	20
Any other*	401	220	327	69

*Includes organisation of Melas, exhibitions, exposure visits etc.

Table 4.8 (b) : Details of Specific Activities Conducted by Type of KVK (On an Average) Annually

Activity	No. of times the activity is conducted					
	Where conducted					
	In KVK			In village/block		
	ICAR/Govt.	SAU	NGO	ICAR/Govt	SAU	NGO
Front line demonstration	17	38	25	51	4779	418
Farmers training	228	572	814	4615	979	841
Technology dissemination	493	28	66	53	79	104
On farm trial	13	48	4	46	117	69
Awareness programmes	21	123	185	46	309	946
Any other*	72	4490	14643	63	186	810
Activity	**How conducted**					
	Individual			Groups		
	ICAR/Govt.	SAU	NGO	ICAR/Govt	SAU	NGO
Front line demonstration	253	1115	836	24	25	2
Farmers training	40	2899	7277	143	310	257
Technology dissemination	4850	2344	10308	53	9	100
On farm trial	90	118	350	3	24	4
Awareness programmes	1781	3323	8507	22	227	721
Any other*	726	2232	12699	52	3228	27

*includes organisation of melas, exhibitions, exposure visits etc.

he data collected indicate that off campus activities are more than on campus activities which is a positive indication of the outreach of KVKs. The data also show that KVKs are concentrating more on individuals than the groups. If they perform their activities with groups of farmers the impact could be more effective.

In addition to the above activities some KVKs produce quality seeds and planting materials and supply them to the farmers. Other activities include organization of *melas*, exhibitions, camps, and farmers' visits outside etc. Involvement of KVKs in such activities appears to be more than their mandated activities.

4.4.3 Requests received from farmers and their disposal

KVKs receive requests from farmers from time to time for information on various aspects, regarding seeds and planting material, quality animals, and for demonstrations and assistance in implementing technologies. The tables below (Table 4.9 a & b) describe the performance of KVKs in handling such requests.

Table 4.9 (a): Average Number of Requests Received and Attended to by Each KVK Annually by Type of KVK and Nature of Request

Nature of Request	ICAR/Govts.		SAU		NGO		ALL	
	No. Recd.	% attended to	No. Recd.	% attended to	No. Recd.	% attended to	No. Recd.	% attended to
Information	901	95.3	2036	95.6	1712	98.0	1632	96.4
Seeds/planting material	5422	84.1	1998	91.4	498	91.5	1711	84.4
Quality animals	245	55.2	62	80.4	36	85.5	68	80.0
Demonstration	105	47.7	280	32.4	217	52.4	217	40.0
Assistance in implementing technology	67	87.5	326	51.3	559	98.0	345	76.0

Generally speaking, a KVK is able to respond very well to requests for information, attending to 96 per cent of the requests received in a year. The KVK also responds to requests for seeds and planting material, quality animals and assistance in implementing technologies reasonably well covering more than three-fourths of the requests. However, in the matter of requests for demonstrations, the response percentage is only 40. This may be because, whereas in the matter of supplying information, seeds and planting material and quality animal, and assistance in implementing technologies, not much organization, planning and resource needs are involved while these factors come into play for organizing demonstration.

Table 4.9(b): Average Percentage of Requests Attended to by Each KVK Annually by State and Nature of Request

Nature of Request	Arunachal Pradesh	Madhya Pradesh	Rajasthan	Maharashtra	Tamil Nadu	All States
Information	90.2	98.9	89.1	99.0	96.9	96.4
Seeds/planting material	68.2	98.4	20.4	99.6	94.8	84.4
Quality animals	76.8	87.2	44.5	89.4	90.6	80.0
Demonstration	96.2	31.7	19.7	70.8	96.5	40.0
Assistance in implementing technology	99.4	95.2	28.7	99.4	91.3	76.0

The data clearly indicate that the performance of the selected KVKs in Rajasthan is definitely poor in attending to requests from farmers in all areas except perhaps in giving

information. KVKs of Tamil Nadu are easily the best performing ones in all areas. Maharashtra lagged behind Tamil Nadu only in the area of responding to requests for demonstrations. Madhya Pradesh fared rather poorly in this area responding only to less than a third of the requests received. Arunachal Pradesh performed well generally in all areas including demonstrations.

4.5 Coordination and Synergy

4.5.1 Involving other agencies in technology demonstrations

For greater effectiveness, KVKs often involve other organizations like NGOs, Self-Help Groups, the local youth, educational institutions and others like seed societies, entrepreneur groups, farmers' clubs, Government departments etc., while undertaking technology demonstrations or other interactions with the farmers. This also helps in subsequent push for implementation of the demonstrated technologies through such organizations. Table 4.10 shows the numbers of KVKs out of the selected ones that involve different organizations.

Table 4.10: Numbers of KVKs Involving Other Agencies in Technology Demonstrations and Other Interactions with Farmers

Type of KVK	Total No. of KVKs of the type	Number of KVKs involving				
		NGOs	SHG	Youth	Educational Institutions	Others*
ICAR/ GOVT.	9	4	5	4	4	5
SAU	24	21	18	21	14	12
NGO	15	13	12	12	13	6
ALL	48	38	35	37	31	23

*include seed societies, entrepreneur groups, farmers' clubs, agriculture departments, financial institutions, political leaders, etc.

It would appear that NGOs, SHG and youth generally are involved in demonstrations and other interactions of KVKs with the farmers.

KVKs reported that they share their technical knowledge with other extension personnel including NGOs at district level by organizing meetings with them, involving them during farmer training programmes and frontline demonstrations. The knowledge is shared with NGOs and agriculture officials in the Government departments on various aspects which range from crop production, crop diversification, plant protection, postharvest management to entrepreneurship development. In the opinion of KVKs this interaction helps in spreading knowledge among farmers at a faster rate. KVKs also organize capacity building programmes in collaboration with line departments, ATMA and other NGOs. Collaboration with other organizations also helps in soil testing and improving health of the soil.

4.6 Technology Transfer and Implementation

This section brings out the results of the study about the performance of KVKs in the area of technology transfer and the implementation of such transferred technologies. It also indicates the views of KVKs as to the types of farmers that are likely to implement a new technology

4.6.1 Technologies transferred by type of Governance KVK of Field

Table 4.11 (a) shows the number of technologies transferred in different field by various types of KVKs during the last five years. The last column of the table also shows the average annual number of technologies transferred by each KVK. On an average, each KVK transfers about 7 to 8 new technologies in a year. It may be noted that several KVKs might be disseminating the same technology. Clearly KVKs managed by NGOs are ahead of others in transferring of with NGO KVK about ten technologies per year against 5-6 by KVKs of other types. State-wise details of types of technologies adopted by farmers as reported by KVKs may be seen in Annex 3.

Table 4.11 (a): No. of Technologies Transferred by KVKs during Last Five Years by Fields and Management Type

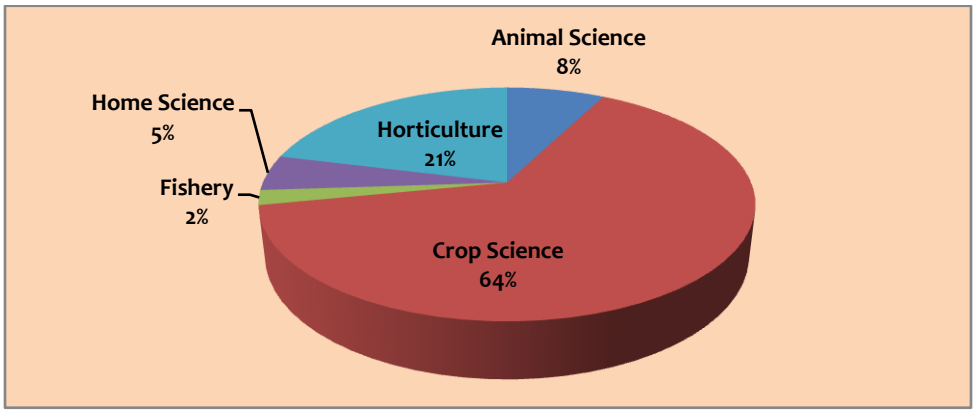
Type of KVK	Number of technologies transferred by field								Total	Average No. per KVK per year
	Horti-culture	Agro-nomy	Plant Technology	Agriculture Extension	Agricul-ture	Animal Science	Home Science	Fishery		
ICAR/ GOVT	92	25	28	15	30	27	21	11	249	5.5
SAU	141	56	34	331	152	31	37	25	807	6.7
NGO	150	55	44	257	138	80	31	1	756	10.1
All	383	136	106	603	320	138	89	37	1812	7.5

Table 4.11 (b) : Technology Transferred by KVKs by State

State	Number of technologies transferred by field								Total	Average no. per KVK per year
	Horticulture	Agronomy	Plant Technology	Agriculture Extension	Agriculture	Animal Science	Home Science	Fishery		
Arunachal Pradesh	35	25	19	25	31	18	25	23	201	6.70
Madhya Pradesh	88	-	8	6	149	8	4	-	263	5.26
Rajasthan	56	32	11	567	5	31	19	5	726	12.10
Maharashtra	114	64	52	3	110	37	24	3	407	8.14
Tamil Nadu	90	15	16	2	25	44	17	6	215	4.30

Table 4.11 (b) indicates that KVKs in Rajasthan followed by Maharashtra are transferring technology more than the KVKs in other states surveyed

Figure 4.6 Distribution of technologies transferred by major fields



Out of the total number of 1812 technologies transferred, 1165 related to agriculture, 383 to horticulture, 138 to animal science, 89 to home science and 37 to fisheries.

4.6.2 Characteristics of Farmers implementing technology

The KVKs were asked about their opinion as to which categories of farmers – rich or poor, those with more land or less, better educated or less, and those near the KVK or away – are more prone to implement the transferred technologies. Their responses are summarized in Table 4.12 below.

Table 4.12: Number of KVKs Reporting Characteristics of Farmers Likely to Implement New Technologies

Indicator wise Perceptions	State wise number of KVK reporting on each indicators					
	Arunachal Pradesh	Madhya Pradesh	Maharashtra	Rajasthan	Tamil Nadu	Total
1. Economic Category						
Rich Farmers	3	9	7	9	5	33
Poor Farmers	3	1	2	1	1	08
No Response	0	0	1	2	4	07
Total	***6***	***10***	***10***	***12***	***10***	***48***
2. Land Holdings						
0 – 1 acres of land	2	0	1	0	0	03
1-3 acres of land	3	1	3	2	2	11
3-5 acres of land	1	3	2	2	1	09
More than 5 acres	0	6	3	6	4	19
No Response	0	0	1	2	3	06
Total	***6***	***10***	***10***	***12***	***10***	***48***
3. Educational Background						
Illiterate	1	1	1	2	0	05

Primary	2	1	1	2	1	07
Secondary	2	4	2	2	3	13
Senior Secondary	0	0	0	2	1	03
Higher Education	1	4	5	4	2	16
No Response	0	0	1	0	3	04
Total	***6***	***10***	***10***	***12***	***10***	***48***
4. Location						
Near to KVK/City	2	2	5	8	4	21
Remote Areas	4	6	2	2	2	16
Both	0	2	2	2	2	08
No Response	0	0	1	0	2	03
Total	***6***	***10***	***10***	***12***	***10***	***48***

Overall, the responses are on the expected lines, though some of the KVKs held different views. For example, most of the KVKs felt that rich farmers, those located near the KVK, those with secondary or higher education and those whose land holdings were comparatively large were more likely to implement new technologies offered by the KVKs. However, it would appear that while the linkage between richness/poverty and proneness to adopt technologies and that between size of holding and proneness to adopt is strong, the effect of education on proneness is somewhat weak. It is perhaps the resources to adopt that matter more than education

4.7 Impact of Technology Transfer

One of the important objectives of this evaluation is to assess how implementation of the new technologies benefited the farmers implementing the transferred technologies. The enquiry therefore sought the opinions of the KVKs about the how the new technologies impacted farmers' productivity, incomes, drudgery, etc. The results indicated a number of positive impacts.

4.7.1 Benefits from Technologies Transferred

Table 4.13 presents the percentage distribution of technologies by types of outcomes of adoption of new technologies for each type of KVKs.

Table 4.13: Impact on Farmers adopting the technologies

Type of Impact	**% of technologies reported by the KVK to have Resulted in Impact**			
	ICAR / Govt.	SAUs	NGO	All
Improved productivity/reduction in cost/reduction in wastage	40.0	37.7	52.8	41.6
Time saving/less drudgery	29.9	21.5	7.4	19.1
Quality of product improved and enhanced incomes	20.9	31.0	35.8	31.1
Enhanced Confidence of farmers	9.15	9.8	4.0	8.2
Total	100	100	100	100

According to the information provided by KVKs, 42 per cent of the technologies adopted resulted in higher productivity and reduction in cost and wastage. About a third of the technologies led to quality improvement and enhanced incomes. One fifth of the technologies proved to be time saving and less labour intensive and therefore led to drudgery reduction. The remaining 8% boosted confidence among the farmers. These percentages are broadly of the same order for various types of KVKs except that in case of NGO KVKs time-saving technologies formed a smaller percentage than in the case of other types of KVKs.

Figure 4.7 Major impacts reported by KVK on their technologies Disseminated – (for total)

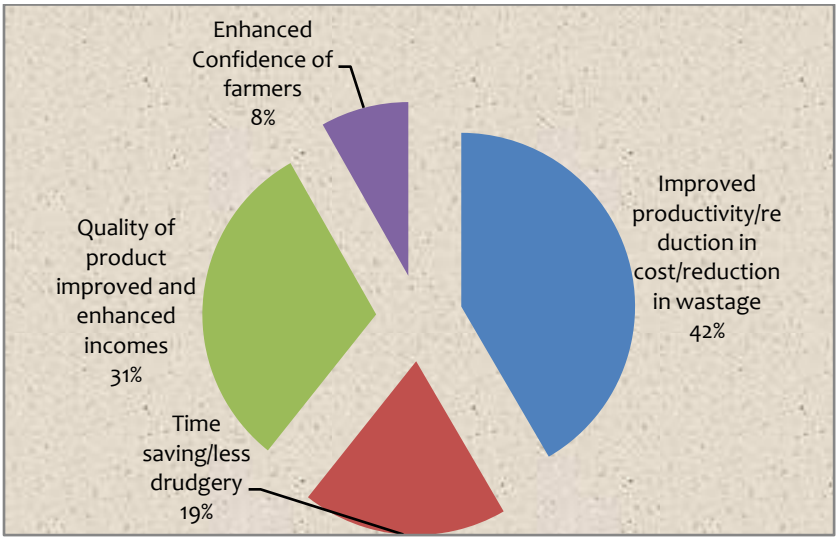
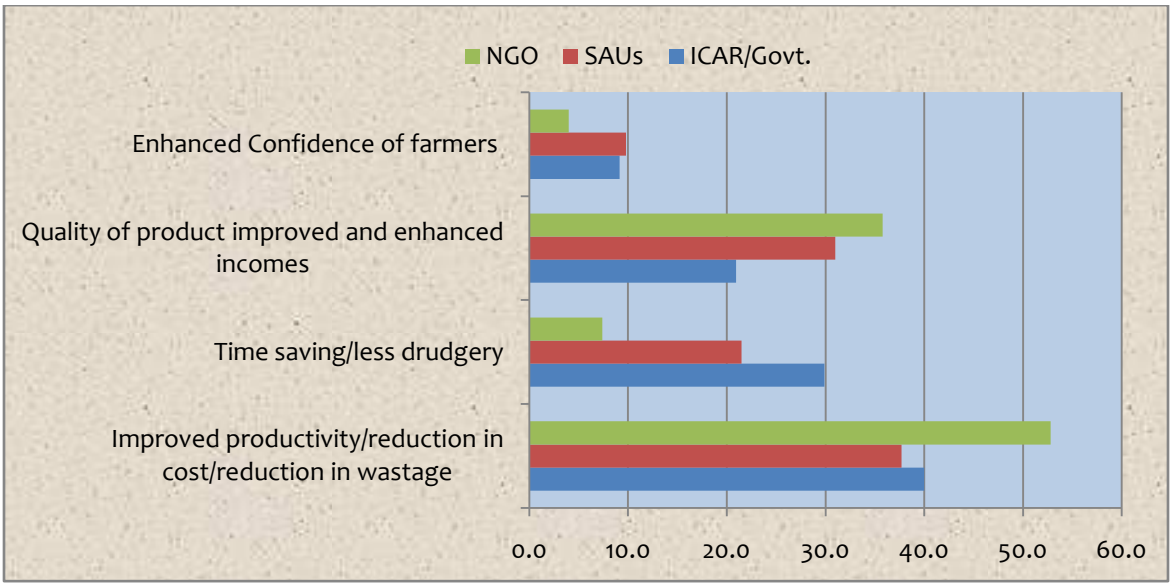


Figure 4.8 Major impacts reported by KVK on their technologies Disseminated



Further discussions on impacts show that generally enhanced incomes are spent in better education of children, accessing better health services or constructing a house and also in

purchasing better inputs for agriculture. This view was supported by interaction with farmers also. Some farmers spend the additional income in marrying off their children. There were also instances, as it was reported, of improper use of the additional income such as for buying alcoholic beverages. Women folk of various villages requested the team that some steps should be taken to close liquor shops in the villages.

4.8 KVKs and Entrepreneurship Development

KVKs also engage themselves in promoting entrepreneurship among the farmers so as to enable them to undertake self-employment ventures in agri-related activities.

4.8.1 Entrepreneurial Training

KVKs provide entrepreneurial training as well as escort services to the farmers who opt for such activities to facilitate their pursuit of the chosen lines of self-employment. Table 4.14 (a) gives a summary of such training programmes organized by KVKs.

Table 4.14 (a) : Average Number of Persons Covered by EDP Programmes of KVKs Annually

Type of KVK	Average Number of Persons Trained by each KVK in a year			Percentage of those who started the business		
	Males	Females	Persons	Males	Females	Persons
ICAR/ Govt.	119	40	159	40.2	7.6	30.1
SAU	65	36	101	19.4	17.6	18.7
NGO	101	37	138	26.7	35.2	29.0
ALL	75	33	108	25.3	22.6	24.5

Tables 4.14 (b) Number of EDPs Oganised by KVKs by State wise

State	Average number of persons trained by each KVK in a year			Percentage of those who started the business		
	Males	Females	Persons	Males	Females	Persons
Arunachal Pradesh	14	20	34	28.6	10	17.6
Madhya Pradesh	80	32	112	31.2	23.4	29
Rajasthan	39	34	73	48.7	20.6	35.6
Maharashtra	105	32	137	9.5	15.6	11
Tamil Nadu	117	45	162	26.5	33.3	28.4

The Table 4.14 (b) indicates that Madhya Pradesh is conducting more EDPs as compared to other states surveyed.

On an average each KVK trained about 100 persons annually through their entrepreneurship development programmes. Three fourths of them were males. By type of KVKs it seems that KVKs under ICAR and NGOs are training more persons. But coverage of females is more in case of NGOs and SAUs. Overall, about a quarter of the persons trained start some or the other self employment venture. It has come to light during FGDs that females form SHG and start economic activities after training. This is corroborated by the fact that women trained by NGOs have the highest percentage of business starters after training.

4.8.2 Forward Linkage Services

As per the information provided by the KVKs, a number of them provided different types of support services to farmers taking up self-employment activities. Table 4.15 gives a summary of these services.

Table 4.15: Support Services by KVKs in Promoting Self-employment by Farmers

Type of service	No. of KVKs providing the service			
	ICAR/ GOVT	SAU	NGO	All
Project preparation	2	15	12	29
Procurement of machinery and equipment	1	14	11	26
Procurement of raw material	2	13	12	27
Assistance in getting loans	3	14	11	28
Technical training	3	19	12	34
Post harvesting	2	19	10	31
Processing of product	3	16	12	31
Packaging	0	14	9	23
Assistance in marketing	3	18	10	31
Post business follow up and advice	2	11	7	20
Other	1	5	2	8

It may be seen that about 30 (approx. 60%) of the 48 KVKs covered by the study provided some form of escort services or other to those farmers who took up self-employment. While most of the services were more or less equally common, it may be observed that post-business follow-up and advisory services were provided by a relatively small number of KVKs (only 20 of the 48).

4.9 KVKs and non-mandated Activities

KVKs are involved in a number of non mandated activities. Some relate to non-mandated agri related activities while some other non- mandated non- agri activities. It has been reported that substantial time is being devoted by KVKs in such activities. While non mandated agri

related activities are understandable as these facilitate spreading technical knowledge; non mandated non agri activities hamper the main activities of KVKs. Time devoted in these activities state-wise can be seen in the Table 4.16.

Table 4.16: Time devoted by KVKs in Non Mandated Activities

State	Non mandated Agriculture related activity			Non mandated non Agriculture related activity		
	% time devoted			% time devoted		
	Upto 25	26-50	Above 50	Upto 25	26-50	Above 50
Arunachal Pradesh	√	-	-	√	-	-
Madhya Pradesh		√	-	√	-	-
Rajasthan	√	-	-	√	-	-
Maharashtra		√	-	√	-	-
Tamil Nadu	√	-	-	√	-	-

It may be seen from the table that on an average about 25% time each is devoted to non - mandated agri activities and non- mandated non agri activities. This aspect needs attention.

4.10 Qualitative Data

Some opinion-oriented questions were also asked from KVKs in the structured questionnaire that was administered to them to understand the process of technology transfer and its adoption by farmers, with a view to find support to inferences from quantitative data. For example, KVKs were asked whether the technology delivered was suitable to women farmers, and how the KVKs services were better than those of other organizations providing extension services and so on. The information provided by KVKs is summarized below:

4.10.1 Services of KVKs and Other Organizations

As mentioned earlier, extension services are being provided by a number of other organizations apart from KVKs and, therefore, KVKs were asked to give their assessment of the relative importance of KVKs' services as compared to other organizations. The information provided by KVKs indicates that the dissemination of technology through them and its impact on farmers' income, employment and drudgery reduction was better than through the services of the other organizations because:

Services of KVKs – an edge over other organisations

- KVKs have demonstration units and farmers visiting KVK can obtain thorough knowledge of technologies by getting first-hand experience.
- KVKs have a team of technical experts in varying disciplines like agriculture, horticulture, animal science, home science, etc. and therefore, advice to the farmers is provided by specialists under one umbrella.
- KVKs have flexibility in their activities and therefore, provide information as per demands of the farmers.
- KVKs use ICT and provide mobile advisory services.

The above facilities provide an edge to KVKs as compared to other organizations.

The KVKs were enquired about their problems they faced in technology transfer. Some of the problems indicated by them are:

- Difficulty in getting suitable technology as per the field level situations.
- Non-availability of any backup of technology if required by farmers and KVK scientists are not able to reply them.
- Lack of infrastructural support and other resources.
- Lack of soil and water testing facilities.
- Lack of input delivery system and availability of planting material and other farm inputs.
- Poor socio-economic status of farmers and small holdings.
- Low education.
- Load of non-mandated activities on KVK scientists.
- Non-availability of low cost technologies.
- Lack of forward and backward linkages especially post harvesting management, marketing and value addition.
- Natural calamities.
- Lack of technology as per the climate change and small holdings.
- Religious myths, mind sets and traditions
- Government policies
- Lack of flexibility in KVK activities
- Lack of desire to take risk
- Lack of accessibility of inputs

The above have also been reported through quantitative data.

4.11 Technologies Suitable to Women

One important aspect of technology transfer relates to the technology's suitability to women. KVKs were asked if the technologies were gender sensitive and were making an impact on women's lives. Most of the KVKs were of the opinion that a number of technologies were gender sensitive and had helped in reduction of drudgery, income enhancement and developing self-confidence among women. Some of the technologies that had helped women were technologies related to value addition and post-harvest management like fruit and vegetable preservation, rural crafts, tie and dye, tailoring and stitching etc. Light weight tools like serrated sickles, wheel hoe, foot sprayer, maize Sheller, groundnut pod stripper, coconut tree climber could be easily operated or handled by the farm women. Technologies relating to making of handicrafts from jute, bamboo, cotton, foam and rubber, nutritional management, kitchen gardening, Azolla cultivation, value addition in potato, soybean, wheat, gram rice, red gram, spices and other had helped women. Drip irrigation saved time. Mulching techniques reduced the weed infestation in cultivation of crops and saved labour, while revolving stool technology reduced pain & increase work efficiency in women while milking. The pest is effectively managed by installing water traps. Women farmers could easily install these traps through which they daily collected the moths and destroyed them. Similarly change of water and pheromone lures was also very easy for women. Vermi-compost production technology was very easy and low cost. The raw material required for the production of vermin-compost was available in the villages. The technology could be easily manageable by women farmers. A number of technologies had helped women in carrying out their household activities. For instance, energy saving devices- like Charcoal sarai cooker, environment friendly stove, integrated nutrient management etc were very beneficial for women.

Chapter V

What the Farmers Say

5.1 Introduction

As a part of study information has been collected from a number of farmers in the selected KVK areas about their awareness about and their experiences with the activities of KVKs. This chapter gives an appreciation of their views on various aspects relating to technology transfer through KVKs. An attempt has been made to identify a group of farmers that was relatively unexposed to KVKs and compare their experiences with those of farmers who had interactions with KVKs, the former serving as a counterfactual in impact assessment. Detailed information can be seen from data tables provided in Annex 2.

5.2 General Characteristics of Farmers

5.2.1 State and Gender:

In all 1870 farmers were contacted in 44 KVKs spread over 5 states covered in the study. The coverage in different states in indicated in table 5.1 with gender wiser distribution.

Table 5. 1: Distribution of farmers by state and gender

State	Males	Females	Total Farmers
1. Arunachal Pradesh	011(44.00)	14 (56.00)	025
2. Madhya Pradesh	487 (90.52)	51 (09.48)	538
3. Maharashtra	364 (90.32)	39 (09.68)	403
4. Rajasthan	367 (89.08)	45 (10.92)	412
5. Tamil Nadu	426 (86.59)	66 (13.41)	492
Total	**1655 (88.50)**	**215 (11.50)**	**1870**

The coverage is more or less balanced across the states with 400-500 farmers per state. The only exception is Arunachal Pradesh where, due to socio geographical conditions only 3 districts could be visited in person and only 25 farmers could be covered.

Gender wise 12 per cent of the farmers were females taking all the states together. Again this percentage is more or less same in all the states except in Arunachal Pradesh, where the number of female farmers covered is more than the males. It was observed that while males are

involved in other activities females are taking up agriculture. The coverage of female farmers is in consonance with the proportion of the female headed households in different states.

5.2.2 Age and Gender:

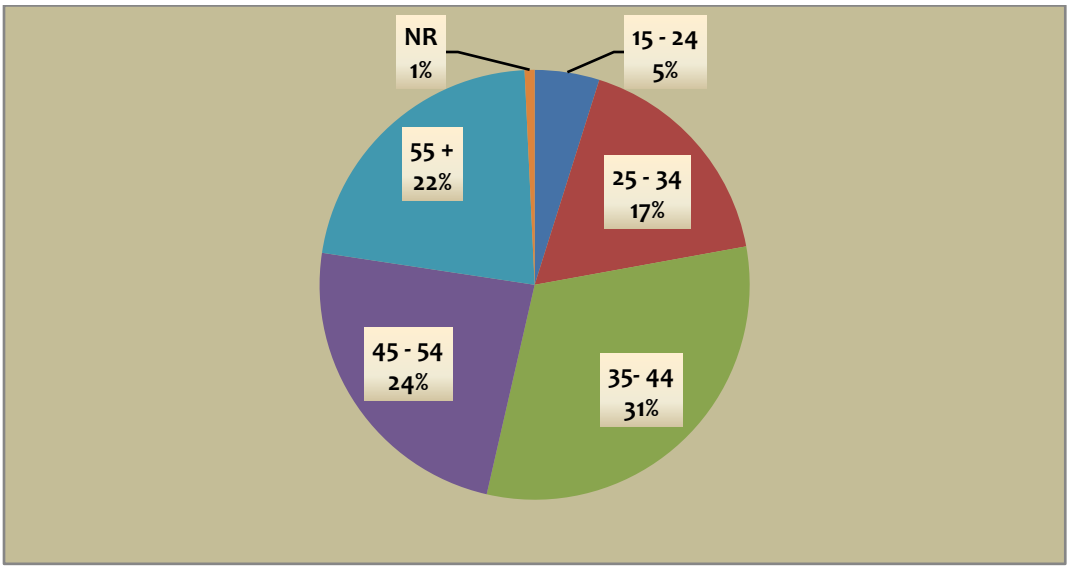
About a third (31.4%) of the farmers covered were in the age-group 35 -44. In the rest of the age-groups except in the age group 15 – 24 the farmers were more or less evenly distributed.

Table 5.2: Number of farmers covered by gender and age-group

Age Group	Number of Farmers			% to total for all ages			%age of females out of all farmers in the age group
	Males	Females	Total	Males	Females	Total	
15 - 24	72	19	91	4.35	8.84	4.87	20.88
25 - 34	281	42	323	16.98	19.53	17.27	13.00
35- 44	511	77	588	30.88	35.81	31.44	13.10
45 - 54	398	47	445	24.05	21.86	23.80	10.56
55 +	380	29	409	22.96	13.49	21.87	7.09
NR	13	1	14	0.79	0.47	0.75	7.14
All ages	***1655***	***215***	***1870***	100.00	100.00	100.00	11.50

A plausible reason for the low proportion in the 15 -24 age group could be that most of the rural youth in this age group opt for either studying or working in non-agricultural pursuits. This phenomenon was also corroborated during the focus group discussions. An interesting point observed here is that the share of females gradually declined as the age advanced.

Figure 5.1: Age Distribution of farmers covered



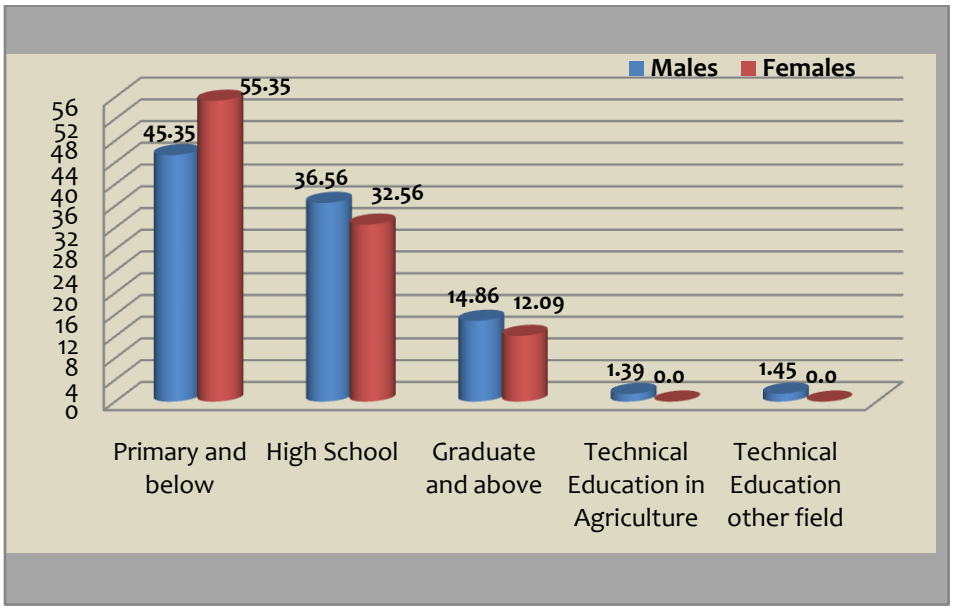
5.2.3 Education and Gender:

About half of the farmers covered (46.5) were either illiterate or educated only up to primary level. A third (36.1%) had high school education and about 15% were graduates and above. Only 1% had technical education in agriculture. This group includes certificate or diploma level education (Table 5.3).

Table 5.3: Distribution of farmers by gender and educational background

Education	Males	Females	Total	Percentage of	
				Males	females
Primary and below	751 (45.38)	119 (55.35)	870 (46.52)	86.32	13.68
High School	605 (36.56)	70 (32.56)	675 (36.10)	89.63	10.37
Graduate and above	246 (14.86)	26 (12.09)	272 (14.55)	90.07	9.93
Technical Education in Agriculture	23 (1.39)	0 (0.0)	23 (1.23)	100.00	0.00
Technical Education other field	24 (1.45)	0 (0.0)	24 (1.28)	100.00	0.00
No Response	6 (0.36)	0 (0.0)	6 (0.32)	100.00	0.00
Total	**1655 (100.0)**	**215 (100.00)**	**1870 (100.0)**	**88.5**	**11.5**

Figure 5.2 Distribution of farmers by gender and education



5.2.4 Size of Land Holding Pattern:

Almost three-fourths of the farmers covered were small and marginal farmers, which more or less agrees with the pattern revealed in last Agricultural Census (2010-11) (Table 5.4).

Table 5. 4: Distribution of Farmers by size of Holdings

Size of holding (in hectares)	No. of farmers covered	% to all farmers	Agricultural Census 2010-11
1 to 3	1099	58.77	67.10
4 to 5	337	18.02	To all farmers
5 to 8	184	09.84	10.04
9 to10	51	02.73	4.25
More than 10	109	05.83	0.70
NR	90	04.81	-
All sizes	**1870**	**100.00**	**100.00**

5.2.5 Coverage of Farmers by Irrigation Status:

About three fourths of the land owned of the farmers covered was stated to be irrigated in some form or the other. The personal interactions indicate that due to shortage of water a number of farmers are using drip irrigation or wells.

Table 5.5: No. of farmers by size of holding (hectares) and irrigation status

Size of holding (in ha)	No. of farmers covered	Total land owned (ha)			% of Irrigated Land
		irrigated	unirrigated	Total	
1 to 3	1099	1989	701	2690	73.9
4 to 5	337	1581	381	1962	80.6
5 to 8	184	1287	436	1722	74.7
9 to10	51	445	138	583	76.3
more than 10	109	1787	655	2443	73.2
NR	90	175	34	209	83.8
All sizes	**1870**	**7264**	**2345**	**9609**	**75.6**

5.2.6 Ownership of Farm Machinery

Overall, slightly more than half of the farmers had some sort of farm machinery. The survey included tractors, threshers, harvesters, milking machines, sprayers, ploughs and the likeas farm machinery. The ownership of farm machinery as expected increased with size of holdings with over 90% of farmers with land of 10 hectares and more having farm machinery. Surprisingly, even among the marginal farmers a substantial proportion (45.7%) had some machinery or other. It was gathered during discussions with farmers that small and marginal farmers had small implements while big farmers had all sorts of farm machinery (Table 5.6).

Table 5.6: Number of farmers by size of holding and ownership of farm equipment

Size of holding (in ha)	**No. of farmers**			**Percentages of**	
	having at least one item of machinery	No machinery	All	farmers with machinery	No machinery
1 to 3	502	597	1099	45.68	54.32
4 to 5	252	85	337	74.78	25.22
5 to 8	126	58	184	68.48	31.52
9 to10	35	16	51	68.63	31.37
more than 10	99	10	109	90.83	9.17
NR	79	11	90	87.78	12.22
All sizes	1093	777	1870	58.45	41.55

The extent of ownership of machinery varied from state to state with 84% of the covered farmers having no machinery in Arunachal Pradesh against 58.5 per cent for all the five states put together. About half of the farmers in Tamil Nadu and Maharashtra also did not have machinery. However, discussions indicated that machinery and equipment are generally hired by the farmers.

5.2.7 Average Incomes of farmers by size of holding

Out of the 1870 farmers covered 1344 had reported annual incomes. The incomes included those derived from agricultural as well as non-agricultural pursuits.

Table 5.7: Average Income of Farmers by Size of Holding

Size of Holdings (in ha.)	**Average annual income (in Rs. thousands)**					
	Madhya Pradesh	Rajasthan	Tamil Nadu	Arunachal Pradesh	Maharashtra	All States
1-3	82.46 (234)	102.98 (158)	94.45 (242)	86.67 (3)	170.11 (158)	107.62 (795)
4-5	127.94(50)	178.73 (55)	109.77 (82)	462.50 (4)	228.14 (51)	159.97 (242)
5-8	180.63 (24)	309.89 (47)	137.60 (35)	720.00 (5)	328.12 (16)	256.43 (127)

9-10	278.00 (5)	175.25 (8)	147.30 (23)	1000.00 (1)	866.67 (3)	244.50 (40)
10+	620.80 (10)	460.54 (28)	320.75 (53)	1000.00 (1)	183.33 (3)	396.35 (95)
NR	70.00 (2)	144.37 (8)	63.23 (26)	-	272.78 (9)	119.87 (45)
All	116.20 (325	184.60 (304)	127.35 (461)	550.71 (14)	205.69 (240)	156.00 (1344)

Figures in bracket are the number of farmers in the respective group reporting income.

The overall average income of farmers covered was Rs 156,000 per annum. The average varied from Rs.108, 000 for those with land holdings of 1-3 hectares to Rs.396, 000 whose land holdings exceeded 10 hectares. It was observed that where families are involved in both agricultural and non-agricultural activities the income was much higher. For those farmers without any other activity the average income was Rs. 125,000 while for those with other economic activities the average was Rs. 212,000.

5.3 Farmers and KVKs

A basic aspect of the impact of KVKs on the farmers is the latter's awareness of the activities of the former. The farmers interviewed were asked whether they knew about the existence of the KVKs and if so whether they knew about the activities of the organization.

5.3.1 Knowledge about KVKs

The results show that over a quarter of the farmers (21%) were not aware of the existence and the activities of the KVKs. The proportion was somewhat higher in Madhya Pradesh and Tamil Nadu (Table5.8).

Table 5.8: No. of farmers about knowledge of activities of KVKs

State	No. of Farmers with		All	% of those with no knowledge
	No Knowledge	with knowledge		
Arunachal Pradesh	04	21	25	16.00
Madhya Pradesh	153	385	538	28.43
Maharashtra	62	341	403	15.38
Rajasthan	77	335	412	18.69
Tamil Nadu	90	402	492	22.38
Total	386	1484	1870	20.64

5.3.2 Awareness of KVKs by Size of Holdings

Table (5.9) indicates that a somewhat higher proportion of small and marginal farmers had no awareness about KVKs activities than that among farmers with larger holdings. The differences, however, are not very significant with 22 per cent of even farmers with 10 ha or more land expressing their lack of knowledge about KVKs.

Table 5.9: Farmers with Knowledge of KVKS by Size of Holdings

Size of Holdings (in Ha)	% of farmers with knowledge of KVKs	No Knowledge	All	% with no knowledge
1-3	57.61	61.70	58.77	29.75
4-5	18.51	16.79	18.02	26.41
5-8	10.82	7.36	9.84	21.20
9-10	2.99	2.08	2.73	21.57
10+	6.34	4.53	5.83	22.02
NR	3.73	7.55	4.81	44.44
All	100.00	100.00	100.00	**28.34**

However focus group discussions bring this phenomenon more clearly that the wealthier farmers take most of the benefits from KVKs' activities.

5.3.3 Knowledge of KVKs by Level of Education of Farmers

Similar results emerge when awareness of KVK activities is studied with reference to the educational level of the farmers, the proportion of those with no knowledge about KVKs and their activities being highest for farmers with primary or below education and gradually falling with higher educational levels. Again, as in the case of size of holdings, the differences are rather small. Also, not much difference is observed in the extent of awareness between men and women farmers.

Table 5.10: Knowledge of KVKs by Education of Farmers

Educational Level	% of farmers with knowledge of KVKs	No Knowledge	All	% with no knowledge
Primary and below	44.78	50.94	46.52	31.03
High School	37.46	32.64	36.10	25.63
Graduate and above	15.37	12.45	14.55	24.26
Others	2.39	3.96	2.83	39.62
All persons	100.00	100.00	100.00	28.34
All Males	88.66	88.11	88.50	28.22
All females	11.34	11.89	11.50	29.30

5.3.4 Knowledge about technology dissemination activity by KVKs

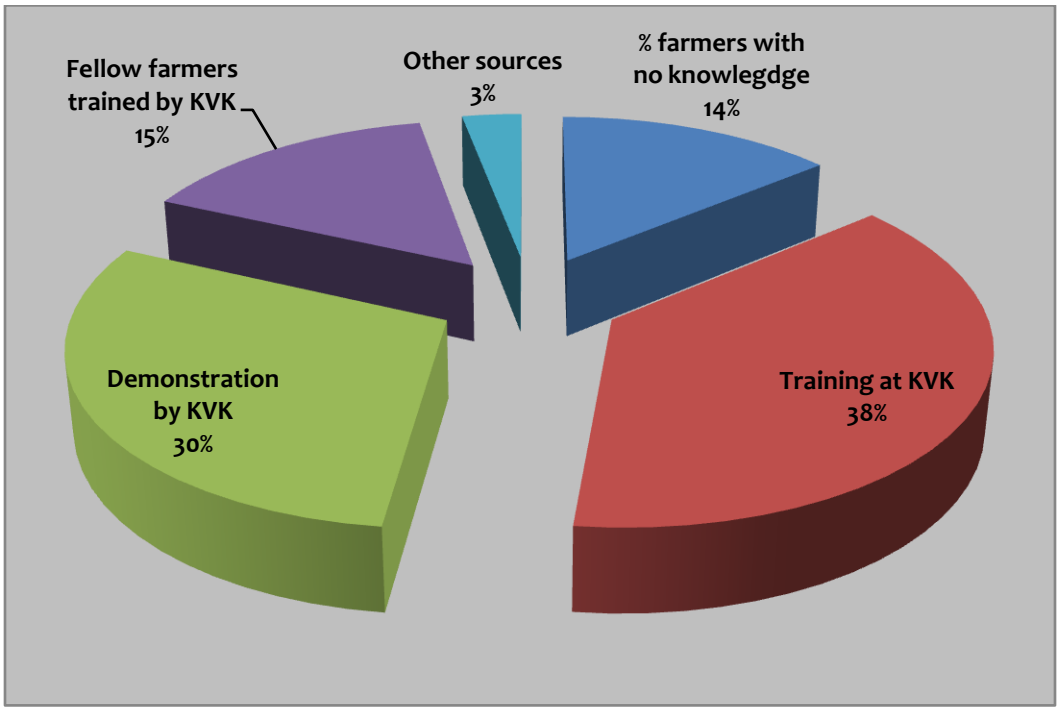
One in six (16.3%) of the farmers surveyed had no knowledge whatsoever about dissemination of knowledge on technologies by KVKs (Table 5.11). While the proportion of those without such knowledge was fairly close to this overall level in Madhya Pradesh, Rajasthan and Tamil Nadu, a greater proportion of farmers in Maharashtra (91.3%) knew about the technology dissemination by KVKs. In Arunachal Pradesh every one of the 25 farmers surveyed knew about it.

Table 5.11: Knowledge about Technology Dissemination by KVKs

State	**% of farmers with no knowledge**	**Percentage distribution of farmers with knowledge by source of knowledge**				
		Training at KVK	Demonstration by KVK	Fellow farmers trained by KVK	Other sources	Total
Arunachal Pradesh	0.0	46.7	40.0	10.0	3.3	100.0
Madhya Pradesh	19.3	48.0	36.1	12.2	3.7	100.0
Rajasthan	18.0	47.2	35.2	15.3	2.2	100.0
Maharashtra	9.7	39.4	33.8	21.8	5.0	100.0
Tamil Nadu	17.7	42.0	33.7	21.5	2.9	100.0
All States	**16.3**	**44.0**	**34.7**	**17.7**	**3.5**	**100.0**

Training and demonstration by the KVKs was the main source of this knowledge. However, it is interesting that about 18 per cent of the farmers had acquired this knowledge from fellow farmers. This knowledge spin-off seems to be stronger in Maharashtra and Tamil Nadu in comparison to the other three States. Barring these rare and interesting deviations, the patterns of acquisition of knowledge about KVK technologies remained fairly uniform across the five States surveyed.

Figure 5.3 Distribution of farmers by source of knowledge on new technology



5.3.5 Source of acquisition of knowledge about technologies

As is well known, dissemination of agricultural technologies takes place through a variety of channels. Apart from KVKs, the district agricultural office (this includes officials concerned with promotion of animal husbandry, fisheries, horticulture and other allied activities), some major industries engaged in retail trade of agricultural commodities, and NGOs also engage themselves in transferring knowledge about new technologies to farmers in furtherance of their own organizational objectives. Table 5.12 indicates the relative prominence of different organizations in this area.

Table 5.12: Distribution of Farmers who Acquired Knowledge about Technologies by Source

Source of knowledge	% of farmers acquiring knowledge about technology from the source					
	Arunachal Pradesh	Madhya Pradesh	Rajasthan	Maharashtra	Tamil Nadu	ALL
Training at KVK	43.2	30.4	27.2	26.8	27.8	28.2
KVK demonstration	36.4	25.6	21.7	21.8	21.6	22.9
District Agricultural Office	2.3	12.2	10.7	10.1	13.4	11.6
Kishan Call Centres	2.3	8.8	5.7	7.4	4.1	6.4

NGO	9.1	4.6	2.3	1.7	3.5	3.2
Industry Sources	2.3	0.9	0.4	1.4	1.1	1.0
Fellow farmers of KVK trained	2.3	8.5	13.1	16.8	14.0	12.9
Other fellow farmers	0.0	4.5	7.2	9.2	8.2	7.2
Own decision to change	2.3	4.1	8.3	4.4	3.8	5.0
Others	0.0	0.4	3.3	0.4	2.4	1.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Clearly KVKs are the front runners with half of the farmers acknowledging that training and demonstrations organized by those institutions accounted for the technology transfer. About one in eight of the farmers acquired the knowledge about the technologies from fellow farmers. Such transfer from fellow farmers was relatively low in Arunachal Pradesh and Madhya Pradesh. The District agricultural offices came third accounting for another one-eighth of the farmers. The distributions are fairly firm across the five States.

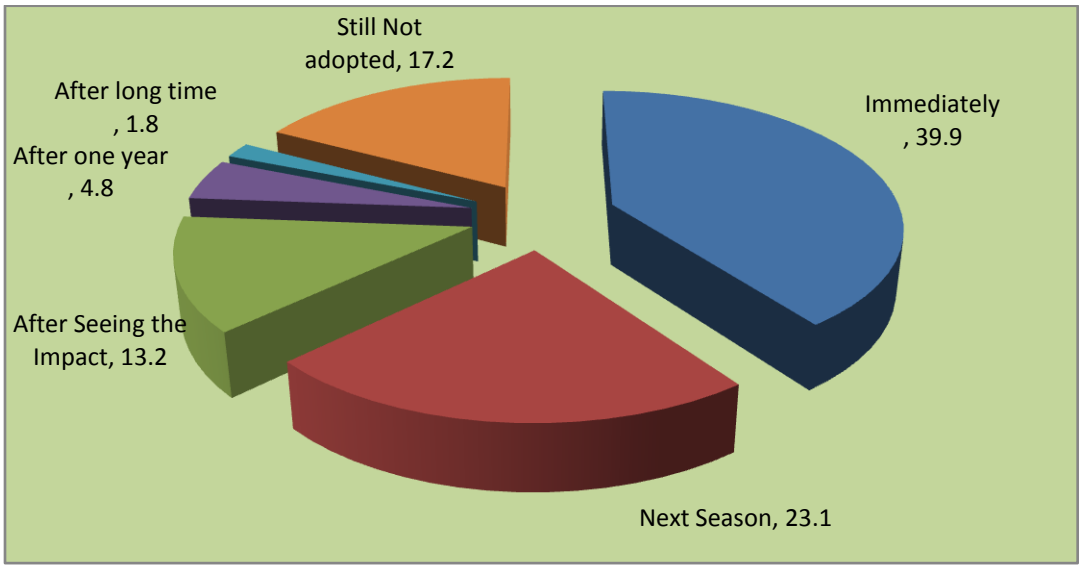
5.3.6 Adoption of Technologies by Farmers

To what extent did the farmers adopt the new technological knowledge acquired by them and how long it had taken them to do so? Table 5.13 seeks to answer these questions.

Table 5.13: Time Taken by Farmers with Different Sizes of Land Holding to Adopt the New Technologies

Size of holding (ha)	Percentage of farmers by time gap in adoption of technology						
	Immediately	Next season	After seeing impact	After one year	After a long time	**Still Not**	**Total**
1 to 3	40.8	22.7	14.4	5.3	2.3	14.6	100.0
4 to 5	43.9	24.0	12.8	4.5	1.5	13.4	100.0
5 to 8	45.1	22.3	8.7	4.3	1.1	18.5	100.0
9 to10	33.3	25.5	15.7	3.9	2.0	19.6	100.0
More than 10	34.9	22.9	10.1	3.7	0.9	27.5	100.0
All	**39.9**	**23.1**	**13.2**	**4.8**	**1.8**	**17.2**	**100.0**

Figure 5.4 Distribution of farmers by source of knowledge on new technology



About 40 per cent of the farmers reported that they had implemented the technology soon after they learned it and about one-fourth did so from the next agricultural season. About 17 per cent had not yet implemented. Surprisingly the proportion of those implementing immediately was higher among farmers with a holding of up to 8 hectares than among farmers with larger holdings. So was the proportion of those yet to implement.

5.3.7 Frequency of Farmers' Visits to KVK

The frequency of visits by farmers to the KVK is a measure of the strength of relationship between them and the institutions. Data gathered from the farmers indicate that a little over a quarter (28%) of the farmers never visit the KVKs. One-fifth of the farmers visit once a month and one-fourth visit once in three months. Some (14%) visit at the start of every season and roughly the same proportion visit (12%) when they are called for training at the KVK (Table 5.14)

Table 5.14: Distribution of Farmers by Frequency of Visits to KVKs

Size of holding (ha)	Percentage of farmers by frequency of visits to KVK						
	Once a month	Once in 3 months	At start of season	When called for training	Total of those who visit	% of those who never visit	All farmers
1 to 3	18.4	27.3	15.0	11.9	72.6	27.4	100.0 (1099)
4 to 5	19.0	24.0	15.4	13.6	72.1	27.9	100.0 (337)

5 to 8	19.6	28.8	9.2	17.9	75.5	24.5	100.0 (184)
9 to10	41.2	21.6	7.8	5.9	76.5	23.5	100.0 (51)
More than 10	34.9	13.8	6.4	11.0	66.1	33.9	100.0 (109)
NR	28.9	14.4	16.7	4.4	64.4	35.6	100.0 (90)
All	**20.7**	**25.3**	**13.9**	**12.2**	**72.1**	**27.9**	**100.0 (1870)**

Figures in the parentheses are the numbers of farmers covered

There is no impact of the size of holding on the frequency of visits up to 8 hectares but thereafter there is a steep rise in the proportion of farmers who visit the KVK once a month.

5.4 Impact

This section looks at the all-important questions of whether the farmers felt that they found the services rendered by the KVKs useful, the types of benefits they derived from the KVKs;' activities and whether the association translated into enhanced incomes and productivity.

5.4.1 Farmers' satisfaction with KVKs

Taking the five States together about 74 per cent of the farmers contacted felt that they were satisfied with the services rendered by the KVKs.

About 11 per cent were not satisfied with the services. The rest did not indicate their perceptions (Table 5.15).

Table 5.15: Satisfaction of Farmers with the Services of KVKs

State	% of farmers satisfied	% of farmers not satisfied	No response	Total
Arunachal Pradesh	84.0	0.0	16.0	100.0
Madhya Pradesh	65.8	18.2	7.0	100.0
Rajasthan	77.2	12.4	10.4	100.0
Maharashtra	83.8	7.2	9.0	100.0
Tamil Nadu	71.5	6.5	22.0	100.0
All States	**74.0**	**11.2**	**14.8**	100.0

These percentages were more or less of the same order for farmers whose size of holdings varied or whose education level varied. For instance, the percentage of satisfied farmers remained between 70 and 80 for all educational levels.

5.4.2 Changes in farm practices

In response to a question on whether there had been any change in their farm practices during the last five years, 87 per cent of the farmers stated that they had made some change or the other. The most commonly reported changes were in diversification of crops and changes in cropping pattern, and use of fertilizers and pesticides. Some farmers reported changes in machinery used and in water use pattern.

Table 5.16: Farmers who made changes in Farm Practices during the last Five Years

State	Total No. of farmers	No. of farmers who made changes
Arunachal Pradesh	25	21
Madhya Pradesh	538	475
Maharashtra	403	385
Rajasthan	412	340
Tamil Nadu	492	411
Total	**1870**	**1632**

5.4.3 Type of Benefits Received

Tables 5.17 and 5.18 present the types of benefits received by the farmers from the KVKs, the former classifying the farmers by their educational level and the latter by size of land holding.

Table 5.17: Percentage Distribution of Farmers by Types of Benefits for each Educational Level

Type of benefit	Educational level			
	Primary and below	High school	Graduate and above	All levels
No benefit received.	24.6	20.4	15.4	27.7
Attended training	59.5	61.0	69.1	76.9
Seen demonstration	50.3	53.9	58.8	66.1
Seed Purchased	33.7	37.3	49.6	46.9
Extension staff visit	41.4	48.1	57.0	57.9
Farm Machinery hire	8.7	10.1	19.5	13.6
Got Vocational training	12.2	14.4	26.5	18.2
Visit to Mela etc.	22.3	30.1	40.8	35.1
Entrepreneurship training	9.3	13.8	22.4	16.2
Setting business	5.6	9.6	15.8	11.3
Soil tested	29.5	36.4	44.1	43.2
Advice for problem	15.5	19.3	26.5	23.4
Others	7.2	8.0	8.8	9.6

Column totals do not add up to 100 as the same farmer may receive multiple benefits

Table 5.18 clearly brings out that in the case of each type of benefit, the proportion of farmers enjoying that benefit goes up as the educational level increases, while that of farmers who did not receive any benefit goes down. Of particular interest is that 22 per cent of graduates availed of KVK's EDP training compared to 9 per cent among primary educated and 14 per cent among secondary educated. Size of holding does not seem to have any impact on the type of benefits received.

Table 5.18: Distribution of Farmers by Types of Benefits and Size of Holding

Type of benefit	Size of land holding (ha)			
	1 to 3	3 to 5	More than 5	All sizes
No benefit received.	20.47	21.66	20.06	20.64
Attended training	61.24	60.24	67.07	61.07
Seen demonstration	51.14	52.52	62.87	52.46
Seed Purchased	37.31	39.47	38.92	37.22
Extension staff visit	46.41	46.29	50.30	45.99
Farm Machinery hire	10.10	11.28	10.78	10.80
Got Vocational training	16.38	15.73	8.08	14.44
Visit to Mela etc.	28.21	27.30	30.54	27.86
Entrepreneurship training	13.83	13.65	9.58	12.83
Setting business	9.37	8.61	8.38	8.98
Soil tested	35.40	33.23	35.33	34.28
Advice for problem	18.74	17.80	19.76	18.61
Others	6.46	9.79	10.78	7.59

5.4.4 Benefits accrued due to KVK intervention

Of the 1870 farmers covered by the survey, 1383 reported beneficial impact of interventions by KVKs. The type of benefits included increase in production and incomes, better quality of produce, reduction in costs of inputs and other costs, access to self-employment and others. These are summarized State-wise in Table 5.19.

Table 5.19: Distribution of farmers who have impact and type of impact after the intervention of KVK

Type of Impacts	States					Total
	Arunachal Pradesh	Madhya Pradesh	Maharashtra	Rajasthan	Tamil Nadu	
Increase in production	37.74	28.93	31.46	28.87	27.56	30.11
Improvement in Quality	28.30	17.36	13.04	14.40	16.62	15.38
Reduction in cost	15.09	37.13	39.73	40.86	38.31	38.26
Increased income	7.55	11.51	11.16	13.07	13.42	12.03
Started self employment	7.55	4.20	3.98	1.40	2.31	3.07
Others	3.77	0.89	0.62	1.40	1.78	1.15
Total	***100.00***	***100.00***	***100.00***	***100.00***	***100.00***	***100.00***

5.4.5 Impact on incomes and Production

The farmers interviewed were asked to indicate if the services rendered by the KVKs ultimately led to increased production and incomes. Over one-third of the farmers did not choose to respond to this question. However, among those who responded, a large proportion (about 75%) reported increases of over 10 per cent both in production and incomes.

Table 5.20: Distribution of farmers who are reporting about changes in production and income

State	Increase in	No. of farmers reporting increase by						
		Up to 5%	5 to 10 %	10 to 20%	More than 20%	Total reporting	NR	All
Madhya Pradesh	Production	23	72	112	134	341	197	538
	Income	27	52	102	156	337	201	538
Rajasthan	Production	08	47	075	120	250	162	412
	Income	15	41	059	130	245	167	412
Tamil Nadu	Production	22	59	117	126	324	168	492
	Income	22	47	095	156	320	172	492
Arunachal Pradesh	Production	00	04	008	007	19	006	25
	Income	00	06	008	005	19	006	25
Maharashtra	Production	17	60	108	087	272	131	403
	Income	19	49	098	105	271	132	403
Grand Total	***Production***	*70*	*242*	*420*	*474*	*1206*	*664*	*1870*
	Income	*83*	*195*	*362*	*552*	*1192*	*678*	*1870*
	% farmers Production	*5.8*	*20.1*	*34.8*	*39.3*	*100.0*		
	% farmers Incomes	*7.0*	*16.3*	*30.4*	*46.3*	*100.0*		

5.5 Counterfactual analysis

5.5.1 Finding a counterfactual

So far the benefits from KVK's activities have been discussed for the entire group of 1870 farmers who were covered by the study. For a more accurate assessment of the impact of these institutions on the farmers, it is necessary to compare the changes taking place in districts/villages/farmers exposed to the interventions of KVKs and those which are completely insulated from these interventions. As already discussed in Chapter III it is not possible to find districts that are so insulated as there is a KVK in almost all districts. Even at the village level, it

was hard to locate villages that have not been influenced by KVKs, directly or indirectly (through mass media, other agencies, etc). This would be largely true of farmers also. Under the circumstances, the following approach has been adopted to generate a comparison group that could be used to make a broad assessment of the impact.

5.5.2 Beneficiary and Comparison groups

During interviews of the farmers, they were asked if they were aware of the existence and activities of the KVKs. About 400 of the farmers out of the 1870 stated that they were not. This group has therefore been taken as the **comparison** group and the remaining farmers who knew about KVKs' activities as the **beneficiary** group. The number in the two groups in different States is shown in Table 5.21.

Table 5.21: Number of Farmers in Beneficiary and Comparison Groups

States	Category of farmers covered		Total farmers
	Beneficiaries	Comparison group	
1. Arunachal Pradesh	021	004	025
2. Madhya Pradesh	385	153	538
3. Maharashtra	341	062	403
4. Rajasthan	335	077	412
5. Tamil Nadu	402	090	492
Total	**1484**	**386**	**1870**

5.5.3 Perceptions about benefits from KVKs

Table 5.22 merely helps in confirming that the comparison group was fairly well insulated from the influence of KVKs. None of that group had received any benefit from KVK. Nor had almost all of them had adopted a technology from KVK. Interestingly, a few (84) from the beneficiary group did not feel benefited and anomalously 10 of the comparison group had adopted a new technology.

Table 5.22: Distribution of farmers by Perception about the Benefit and Adoption of Technology

States	Beneficiary Group		Comparison Group		Beneficiary Group		Comparison Group		Total Farmers
	Benefited	Not Benefited	Benefited	Not Benefited	Yes Adopted	Not adopted	Yes Adopted	Not adopted	
Arunachal Pradesh	21	00	00	04	20	01	00	04	25
Madhya Pradesh	385	00	00	153	385	00	00	153	538
Maharashtra	333	08	00	62	336	05	00	62	403

Rajasthan	303	32	00	77	290	45	10	67	412
Tamil Nadu	358	44	00	90	352	50	00	90	492
Grand Total	***1400***	***84***	***00***	***386***	***1383***	***101***	***10***	***376***	***1870***

Note * Out 0f 1484 target group farmers 84 farmers say they didn't receive any benefits from KVK

5.5.4 Changes in farm practices

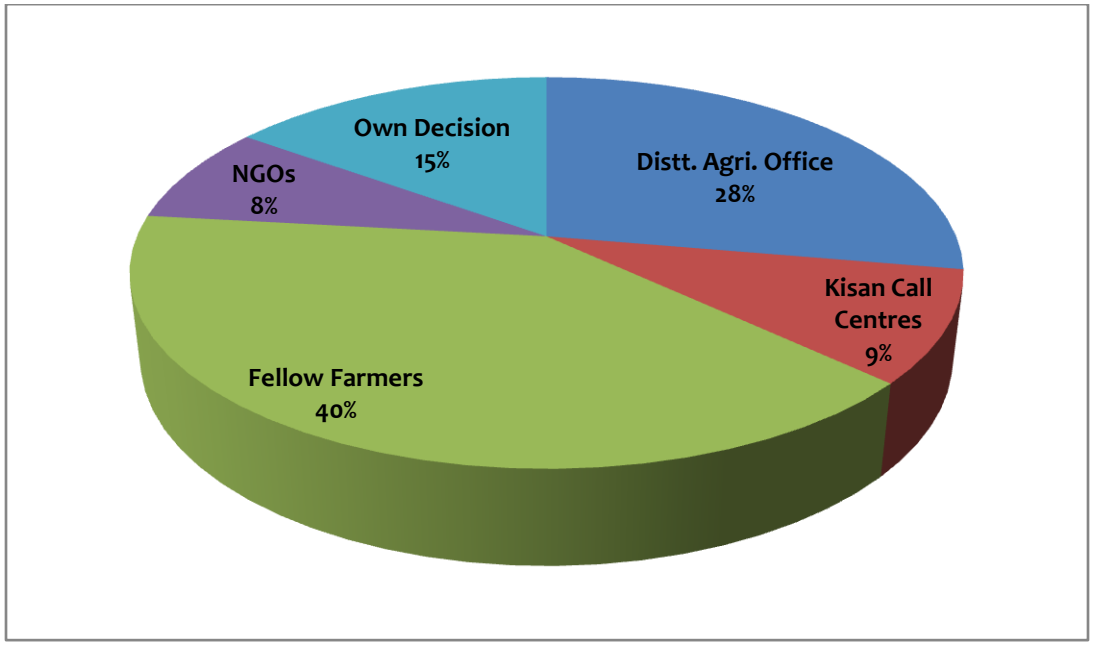
A much larger proportion of the farmers in the beneficiary group (93.7%) had changed their farming methods during the last five years than the comparison group (62.7%). (Table 5.23)

Table 5.23: Percentage of Farmers in the Beneficiary and Comparison Groups who Changed Farming Practices during the Last Five Years

State	% farmers who made changes in farm practices	
	Beneficiary group	Comparison group
Arunachal Pradesh	90.5	25.0
Madhya Pradesh	93.2	58.8
Maharashtra	93.0	79.0
Rajasthan	94.0	55.8
Tamil Nadu	94.5	65.6
Total	**93.7**	**62.7**

While in the case of farmers from the beneficiary group the technology became available from KVKs, in the case of the comparison group, it came from fellow farmers in 45% of the cases.

Figure 5.5 Distribution of control group farmers by source of knowledge on new technology



5.5.5 Comparative Changes in production and incomes

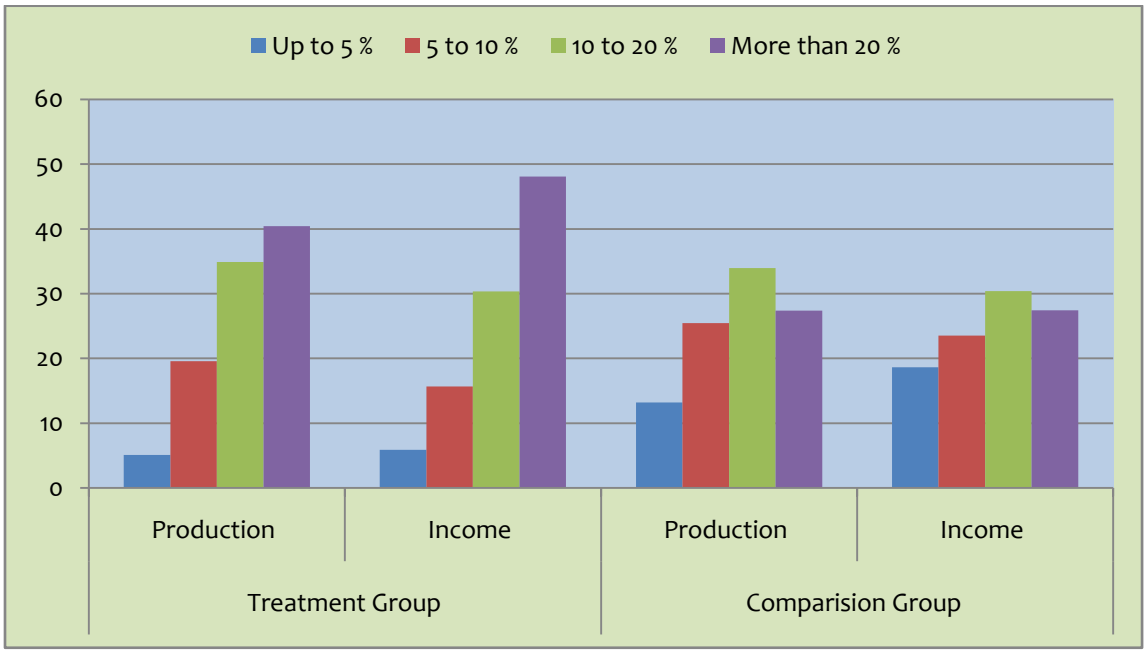
Finally, a comparison of the farmers' responses about production and income increases as a result of changes in farm practices is attempted for the two groups in Table 5.24.

Table 5.24: Levels of Changes in Production and Incomes of Beneficiary and Comparison Groups

Percent increase	Production		Incomes	
	Beneficiary Group	Comparison Group	Beneficiary Group	Comparison Group
Up to 5%	5.1	13.2	5.9	18.6
5 to 10%	19.5	25.5	15.7	23.5
10 to 20%	34.9	34.0	30.4	30.4
More than 20%	40.5	27.4	48.1	27.5
Total reporting	100.0 (1100)	100.0 (106)	100.0 (1090)	100.0 (102)
Not reporting	384	280	394	284
All	**1484**	**386**	**1484**	**386**

The above evidence and Figure 5.4 show that both in production and incomes the increases in the case of farmers in the comparison group lagged behind those for the beneficiary group. For instance, only 27 per cent of the comparison group reported increases of over 20 per cent in both production and incomes against 40 per cent of the beneficiary group.

Figure 5.6 Distribution of farmers by change percentage in Production and Income



It would generally appear that technology transfer through KVKs had a beneficial effect on the farmers.

5.6 Qualitative Indicators

There had been a number of queries that could not be answered through qualitative measures. Therefore certain open ended questions were included in the structured interview schedule for farmers.

5.6.1 Non-mandatory Activities:

Farmers were asked about their views and perceptions on other non-mandatory activities of the KVK. It was noticed that in general farmers are not able to distinguish between mandated and non-mandated activities of KVKs. Only one-fourth (24.6 percentage) of the farmers were informed about the non-mandatory activities of the KVK. Apart from their routine demonstration and training, the dissemination of knowledge/information through short-message services (SMS) of the KVK is most preferred activity. Linkage services, marketing assistances, awareness campaigns, personal touch with farmers and provision of self-employment oriented programmes are the other activities indicated by the farmers (Table 5.25).

Table 5. 25: Number of Farmers Reporting Non-mandatory Assistance from KVKs

Other Helps Provided by the KVK	State wise number of famers reporting					All India
	Arunachal Pradesh	Madhya Pradesh	Maharashtra	Rajasthan	Tamil Nadu	
1. Marketing Assistances	0	07	17	03	18	45
2. Assistances to get benefit from other welfare schemes of the Governments	0	03	07	01	09	20
3. Personal contacts with farmers	0	21	00	03	07	31
4. SMS and Toll Free Phone service	1	31	18	07	16	73
5. Self –employment trainings	0	09	01	04	16	30
6. Provision of Machineries and equipments (Non-agricultural like, Sewing Machine, etc)	0	09	05	07	07	28
7. Support to form Farmers Group/Federation	0	0	06	0	11	17
8.Linkage services others institutions/farmers	1	27	07	0	24	59
9. Assistance to get financial support banks	1	09	01	0	08	19

10. Awareness campaign	0	16	03	06	11	36
11. Community well /Pond	0	0	00	02	0	02
12. Rain Water Harvesting/water refreshing	0	0	02	04	10	16
13.Package/storage/value addition methods	0	06	01	0	06	13
14. Socio-economic support to weaker sections	0	04	01	0	07	12
15. Assistance to set up business/registration	0	07	01	0	01	09
16. Nutritional Supports/Assistances	0	04	00	0	04	08
17. Others *	1	06	12	12	11	42
Total	**04**	**159**	**82**	**49**	**166**	**460**

* Includes, Net house, Provision of information about other related services, Organization of Krish Mahautsav, Door step Service, Treatment to animals, given silage bags, Seed purchase from KVKs ,

5.6.2 Making KVKs more Effective and Efficient

Farmers were asked about how to make KVKs more effective and efficient. More than half (54.33 percent) of the farmers expressed their opinion on this aspect and stated that the present activities and mandate needs to be reviewed and expanded. Large numbers of farmers are expecting more subsidized inputs from KVK. Farmers need hiring of farm equipments through KVKs (Table 5. 26).

Table 5.26: Farmers opinion about making KVKs More Effective

Areas which needs action for better performance	State wise number of famers reporting					All India
	Arunachal Pradesh	Madhya Pradesh	Maharashtra	Rajasthan	Tamil Nadu	
1. More machineries needed	0	15	14	29	51	109
2. More staffs at KVK	0	14	09	14	19	56
3. Inputs at subsidised rate	1	32	13	31	40	117
4. Timely service is needed	0	08	11	03	27	49
5. Coverage to be expanded (all villages and all farmers)	0	03	18	16	29	66
6. Awareness generation programmes	0	06	06	08	13	33
7. Frequency of training	0	64	14	19	17	114
8. Regular field visit of SMS of KVK s	0	34	18	21	41	114
9. Financial assistance from KVK	1	14	04	03	10	32
10. Better marketing support	0	21	06	04	16	47

11. Season specific activities	0	07	08	02	04	21
12. Local based technology	0	08	03	0	08	19
13. More schemes to be routed through KVK	0	04	0	03	16	23
14. Technology to reduce labour dependency	0	0	03	0	17	20
15. Technology to be disseminated in a simplified manner	0	07	02	0	10	19
16. Duration of training to be increased	0	07	08	06	11	32
17. Common Display/Notice is needed	0	0	04	0	06	10
18. Transport facility /travelling allowances needed	0	0	09	17	0	26
19. Procurement Centre at KVK	0	09	05	05	07	26
20. Support to bio-fertilizers and organic farming	0	12	0	0	14	26
21. Problem solving methods	0	0	03	02	13	18
22. Others*	0	07	07	05	24	43
Total	02	272	165	184	393	1016

* More vocational trainings fields and financial assistance for self employment, processing centres, value addition centres at KVK, Seed, multi-cropping techniques, support as groups, information to be gathered from farmers about their requirements KVK should be involved in fixing the price, Weather information to farmers, which crop is profitable during the season , Linkage with Kishan Call Centres for information display, should help to operate factories, Already they are providing best services, Prior intimation is needed to call a meeting at villages by at least one week, water shed programmes KVKs branches at Blocks is needed, Alternative economic activities to be promoted in village through KVK like, Goat, Poultry and cattle , Honey\bee etc.

5.6.3 KVK's Services/Activities most benefited

844 out of 1870 farmers expressed their perception about most beneficial services and activities of KVKs. By and large farmers indicated systematic cultivation process as the main or most beneficial activity. Seed planting technique, enhanced cultivation process, water management are the other areas which benefited farmers more (Table5. 27).

Table 5.27: Farmers reporting service/training of KVK benefited more

Fields of Technology Disseminated by KVK	**State wise number of famers reporting**					**All India**
	Arunachal Pradesh	Madhya Pradesh	Maharashtra	Rajasthan	Tamil Nadu	
Systematic cultivation process for crops	1	63	38	36	31	169
Poultry farming	1	08	0	0	06	15
Introduction of new seeds	0	0	0	0	13	13
Nutritional Advices	1	00	0	01	0	2

Water Management (Drip Irrigation)	0	06	06	11	17	40
Seed Planting Techniques/Conservation	0	22	19	16	15	72
Post harvest techniques	0	01	02	02	12	17
Precision farming methods	0	0	0	0	10	10
Enhanced cultivation process	0	18	12	12	12	54
Plant protection techniques	0	0	06	07	9	22
Quality of produces	0	0	0	0	13	13
Value Addition	0	04	04	0	11	19
Fruits and vegetables preservation methods	0	14	11	04	14	43
Mobile messages on alters	0	19	09	03	13	44
Material provision by the KVK	0	12	0	0	0	12
Mulching techniques	0	03	0	0	03	6
Zero Tillage techniques for crops	0	07	03	0	0	10
Dairy development techniques	0	06	12	01	14	33
Dry farming methods	0	10	0	04	0	14
Linkage services	0	02	0	01	06	9
Integrate Farming System	0	13	05	05	15	38
Mixed/Multi cropping system	0	11	06	0	12	29
Visit to melas/exhibitions	0	09	0	0	10	19
More production with less expenditures	0	0	08	0	05	13
Animal Health Practice and Management	0	0	13	12	12	37
Pest control techniques	0	0	16	03	11	30
Use of Fertilizers	0	0	07	04	10	21
Testing of soils	0	02	03	08	07	20
Others*	0	09	05	04	02	20
Total	**03**	**239**	**185**	**134**	**283**	844

* Vermi compost, use of natural treatment for paddy crop, crop intensification, use of balanced fertilizers, soft toy making, Polyhouse technique, organic methods, Income from farm activities throughout the years, Climbing on coconut trees etc.

5.6.4 Most useful technology

In case of most useful technology imparted by KVKs, only few farmers (296 out of 1870) responded and that too mostly from Tamil Nadu. The systematic cultivation techniques, seed use methods, problem solving techniques, dairy related activities are indicated by the large number of farmers as useful technologies. Integrated farming system, feed management and proper use of chemical fertilizers are the other techniques which benefited more farmers.

Chapter 6

Outcome of Interactions with Stakeholders- A Summary (State-wise)

Background

The study has covered about 50 KVK from five states of different regions of the country. About 40 KVKs are personally surveyed by the core team members in Arunachal Pradesh (3 KVKs), Madhya Pradesh (10 KVKs), Maharashtra (8 KVKs), Rajasthan (8 KVKs) and Tamil Nadu (10 KVKs). It was observed that KVKs in each state are unique and different from other and even KVKs within states are differing from each other due to geographical and agro-climatic differences. In general, all the KVKs are performing their mandates fully in order to transform the farming community to sustain. There are some differences in the volume of activities performed by each KVK due to the availability of resources but their front line demonstrations and mandated activities have reached to farmers in each district. State wise brief highlights are presented in the following paragraphs. KVK wise details can be seen in **Annexure 4.**

6.1 Arunachal Pradesh

The State of Arunachal Pradesh has hilly terrain and is one of the richest hubs of natural biodiversity in the world. It is surrounded on three sides by Bhutan, China and Myanmar. It is the largest north-eastern state with an area of 83,743 sq. km and with an evergreen forest cover of over 82 per cent of its total land area. It receives an average rainfall of above 3000 mm per year and its climate ranges from sub-tropical in the south to Alpine in the north. The climate varies with elevation. The state is thinly populated in terms of population density as compared to other states. Out of 13 KVKs, 6 KVK have been covered for the study and 3 KVKs (Papum Pare, Dirang and Twang) have been personally visited in the state. KVK's performance in the front line demonstration is good in such a difficult terrain region.

KVK, Papumpare is located centrally with wide area. There are 26 major tribes and 110 sub-tribes in the district. A number of local languages is the medium of communication. The KVK here is functioning under the Department of Animal Husbandry, Arunachal Pradesh. Farmers are following traditional method of cultivation process and the KVK staff is needs to be familiar with the locally spoken languages to convince them to make changes in the farming practice. The acceptance and adoption rate of new technologies is low in the district. KVK in Papumpare is also engaged in providing training to farmers as per mandated activity under outreach programmes. In-house training is not being organized because of insufficient space and inadequate response from the farmers. KVK is housed in a rented accommodation. During FGDs it has come to light that although there are a number of departments and organizations that

provide guidance to farmers, the KVK provides a common platform for knowledge sharing among various stakeholders through Kisan Melas and other events.

KVK Dirang is in the west Kemang district which was established in 2005. The district has 4 development blocks: Dirang, Kalaktang, Nafra, and Thrizino-Buragaon with about 260 villages. Coverage till now is about 40 villages so far. Majority of the farmers are marginal and small category of farmers. The coverage and reach of KVK in the district is not up to the mark due to geographical location, climatic conditions etc. It has been observed that the KVK has made efforts for technology transfer but some technology cannot be adopted by farmers due to various reasons. On Farm Trial (OFT) has been organized integrating the crops of maize and paddy which has been successful; when other farmers learnt about it they wanted to adopt the technology but asked for seeds, etc. to do the same. KVKs are not mandated to provide seeds as such and resources are scarce in the district. Training to have bio-neem fertilizers has also been introduced but because of lack of inputs availability in the area farmers are unable to adopt it. Flax-seed became very successful as winter crop when integrated with wheat. RCM 76 maize crop which was successful in Nagaland but failed in this area. This shows that new technologies are to be tested and modified as per local area climate. It has also been observed that generally big farmers get most of the services from KVKs and small farmers are left out due to various reasons.

While interacting with farmers it was observed that other departments are providing subsidies in cash or kind, expectations from the KVK is also of similar nature. Once farmers know that KVK will not provide anything in kind of subsidy they were not much interested in attending the programmes organized by the KVK. During the discussion it has also been observed that farmers are willing to adopt new technology only after seeing the success of a technology. The possibilities can be explored by KVKs to adopt some villages at a time and implement the technology. Once successful, this can be replicated in other areas. Farmers should be brought to see the success of a technology

KVK, Tawang The district has 8 blocks with more than 1,100 villages. The district is at an elevated area with frequent snowfall. The KVK is covered under the State Government, Directorate of Agriculture. The KVK has been able to cover 25 villages so far as the villages are in far-flung areas and officers are not able to access the remote places. They have stated that there is no provision and facilities for stay and that is one reason that they are unable to provide the services. The KVK formed 2 SHGs and persuaded farmers to have vegetables cultivation. Onion cultivation has also been started. Vast majority of the villages in the district is still uncovered by the KVK in the district. Geographical location and climatic conditions is the main reason for less scope and coverage of villages by the KVK. KVK is facing the crunch of facilities also.

During the discussion with the officials, it has been observed that the new varieties of wheat and groundnut have been introduced which has increased production. Many farmers have adopted "ketaki" variety for paddy. The cultivation of peas has also been started. The families in this area are not much interested in agriculture and males are doing the work of Contractor and have opened shops while ladies are doing farming. The farmers have been taught the technology of pruning. KVK reported that they are helping the small farmers in nearby villages. Here also, families expect money or subsidy or facilities in other kinds. The KVK functioning in rented places does not have any facilities for hostel, etc. Most of the programmes by KVK are being organized in the villages.

Achievements of Surveyed KVKs in Arunachal Pradesh

- KVKs has made an outreach to farming communities in the state – Impact of the KVK's front line demonstration is a visible fact particularly among the big farmers,

- Adoption of disseminated technologies/improved practices by the farmers has been observed again among the big farmers in the district,

- KVK's linkage with other institutions was observed. Apart from their mandates, the linkages are helping KVK to do more projects for farmers.

Challenges

- Difficult geographical conditions,
- Least density of population is the main hurdle,
- Resource crunch –state needs special allocation to reach the farming community due to its geographical location,
- The mindset of the farmers which hampers adoption of new techniques especially among marginal and small farmers.

Major recommendations

1. To make a visible impact KVKs need various resources as per local needs. For example, to access various villages in the remote areas substantial budget provisions are needed.
2. For technology transfer inputs should come as a complete package. For example, introduction of New Zealand rabbit breed requires specific feed material, medicines, etc. Similarly, complete value chain is needed with introduction of new crops, varieties and so on. With introduction of new technology production increases. Forward linkages in terms of post-harvesting, transportation, packaging, marketing are necessary for new products or high yield products.
3. KVKs should be developed as Resource Centres which can provide/facilitate the access to inputs for farmers to adopt new technology. In case, new variety of seeds or fertilizers

is introduced, farmers are unable to procure it at their own level. This is one of the reasons that technology did not get percolated at local level.

4. To make the technology transfer successful, it is necessary to release funds on time as per agro-climatic season of the particular area. It has been observed that KVKs under the state departments in Arunachal Pradesh have not received funds even for their salaries for the last six months.
5. Training to farmers should be so designed that it may be imparted at the time of sowing, harvesting and post-harvesting. Then only it would have its immediate impact. Funds should also be available accordingly.
6. Indigenous technology comes from farmers. A number of progressive farmers are experimenting on their own. Their technology should be taken a note of. It has been stated that experts during zonal level workshops require a written documents with source for such indigenous technology, while farmers are unable to provide such documentation. The possibilities of knowledge sharing of indigenous technology and replication should be explored.
7. While KVKs have been able to attend the problems of big farmers and get success in technology transfer, they are not able to cater to the needs of small farmers and farmers in far-flung areas. Most of the demonstrations, on-farm trials, seeds distribution, etc. are conducted for big farmers only. It has also been observed that same farmers get benefitted by KVKs again and again.

6.2 Madhya Pradesh

Madhya Pradesh is the second largest state in the country with an estimated population of about 60 million. Agriculture is predominant sector in the state with 75 per cent of rural population largely dependent on it. This results in wide availability of manpower at reasonable cost. The agriculture sector forms almost one-third of the Gross State Domestic Product (GSDP) and forms the backbone of the MP's economy. The State has 5 crop zones. 11 agro-climatic regions and 4 soil types, which add to the biodiversity in the State and acts favourably for the production of various crop types. MP is the largest producer of pulses and oilseeds in the country. The state also has a major share of the national agriculture production. About 25 per cent of the pulses and 40 per cent of grams are grown in the state.

Madhya Pradesh is one the dry and geographically scattered states in the country. By and large monsoon is the major source of the irrigation. Success and failures of the crops and disseminated technologies completely depends upon the rainfall. Despite this situation, the state is one of the leading producers of many crops in the country. KVK is acting as the major source of technology transfer. 10 out of 47 KVKs are surveyed for this study and has an elaborative discussion with officials.

Strength

- Farmers have started moving from traditional crops to cultivation of commercial crops after KVKs' initiatives
- Cultivation of more new crops and getting better yield
- Changes in cropping pattern and adoption on new methods of cultivation
- Farmers are willingly to come forward to attend the trainings/see demonstrations
- There is positive impact of the KVK's services
- The successful practice of farmers-to-farmers methods of knowledge sharing
- Increase in yield and farm income after the KVK's intervention
- Some of the surveyed KVKs act as technological hub and provide latest and innovative technology to the active farmers of the district,
- Farmers take keen interest and participate in all the activities of transfer of technology (training, OFT, FLDs, Vocational training etc.).

Weakness

- Lack of infrastructures (road connectivity, availability of electricity, communication networks etc.) in the states as well as in KVK is hampering the functioning of the KVK,
- KVKs are poorly equipped with machineries and equipments for training,
- KVKs are lacking human resources as the compared to their coverage /target area,
- Mechanization of agriculture is also very slow among the farmers in the state,
- KVK is not having latest machineries and equipments to give training to farmers,
- Active participation of the SMSs in non-mandatory activities,
- Poor/small farmers are not getting their share in the services of KVK,
- Technology is needed at affordable rate by the marginal and small farmers.

Major recommendations

- Additional budgetary allocation for creating infrastructure is needed for the KVks. At the time of setting up of the KVK there were some provisions afterwards these provisions are not there in budget allocations. Lot of KVKs are facing the shortage of infrastructure facilities,
- KVK should be made as 'Nodal Agency' for farmers related services. Multiple institutions are providing similar services to farmers which should be channelized under one route under KVK for smooth and sustainable functioning,
- A feasible technological dissemination is needed to reach the marginal and small farmers-the disseminated technologies by majority of KVKs is affordable to big (Rich) farmers,
- A routine feedback mechanism should be there in the KVKs to have the perception of majority of the farmers on each mandated activity of the KVKs,

- Transport facilities should be there at KVKs to pick up and drop the farmers from different part of the district. At present it has been observed that mostly same farmers, those who can manage the transport are attending the programmes organized by the KVKs. Still there are a number of uncovered villages/hamlets in each district which needs the extension services of KVK in the district,
- Action may be taken to supply quality seeds for each crops. Only KVK can function as distributing agency for seeds and fertilizers at district level –which have the qualified and professional staff to certify the quality and quantity of the inputs. At present some KVKs are supplying seeds and other inputs to very few farmers in a very limited quantity.

6.3 Maharashtra

Maharashtra is a highly industrialized state of India, agriculture continues to be the main occupation in the state. It is the third largest state in the country with an area of 307,713 Sqkm with 17 percent forest cover. It is bordered by three major states Andhra Pradesh, Karnataka and Gujarat and the Arabian Sea is located on west coast of Maharashtra. Marathis comprise the majority of population. The state is organized into seven divisions i.e. Amaravati, Aurangabad, Nanded, Konkan, Nagpur, Nasik, and Pune which are further divided into 36 districts.

During the recent past the state has seen continuous crisis of farmers and agriculture in the country. Even after making continuous efforts by the government, farmers in some region of the state are facing severe crisis. Krishi Vigyan Kendras (KVKs) in the state is contributing for the development of agriculture in the state. There are 44 KVKs in the state out of which 10 KVKs from different regions of the state has been covered for this study. It is observed from the discussions that, KVK should be made as nodal agency for implementing all schemes relates to farming and farmers in order to make the farming a sustainable one.

Strengths

- Districts and KVKs are better equipped with infrastructure facilities,
- Small and medium farmers are slightly more in numbers in the state,
- Technologies disseminated by KVKs has an impact among farmers in state,
- Impact of the KVKs services is more visible in the state as witnessed by the visiting teams in the various districts,
- Farmers have more trust with KVK than the line departments,

Weakness

- More financial and human resource allocation is needed for better coverage and its impact among farming community,
- More inputs are needed through KVKs to solve farmers issues,
- Frequency of field visits by the KVKs' scientists needs to be increased especially for more problematic areas,
- Timely delivery of services is needed as it takes more time to get the soil tested and information about the crops suitable for the season and precautionary measures etc.,

Major recommendations

- Support to mobilize entrepreneurial skills of the farmers- KVK should coordinate to start agri-business centres by the farmers in villages,
- Rural works under MGNREGA may be linked with farming activities though KVK,
- More farm implements and machineries may be made available at KVKs for the use of small and marginal farmers,
- Region / location specific technology or new techniques is to be initiated,
- KVK should focus on post harvest techniques to support farmers especially processing units to be established by KVK for the use of farmers,
- KVK should help farmers to purchase tractor and other farm equipments.

6.4 Rajasthan

A significant portion of the economy of Rajasthan is agrarian. The agricultural sector of the state accounts for 22.5 per cent. The arid state which receives not more than an annual rainfall of 25 cm thrives on agriculture that is done with irrigation systems. A major portion of the state is parched and infertile. In such areas, agriculture becomes very difficult. The total cultivated area of the state encompasses about 20 million hectares and out of this only 20% is irrigated. Ground water level is available only at a depth of 30 to 61m. Rajasthan farmers have to depend on different sources of irrigation that include tube wells, wells and tanks. The Punjab Rivers in the north, the Narmada River in the south and the Agra Canals from Haryana and Uttar Pradesh provide water to the dry lands of Rajasthan. Northwestern Rajasthan is irrigated by the Indira Gandhi Canal. The State shares a long international border with Pakistan. As in other parts of the country, Rajasthan has two principal crop seasons- Rabi and Kharif. The main Rabi crops are Barley, Wheat, Gram, Pulses and Oil Seeds. The major oil seeds are Rape and Mustard. The Kharif crops are Bajra, Pulses, Jowar, Maize and Ground Nut.

The state of Rajasthan is largest in India constituting 10.4 per cent of total geographical area and 5.67 per cent of total population of India. Physio-graphically, the state can be divided into 4 major regions, namely:

(i) The western desert with barren hills, rocky plains and sandy plains; (ii)
(ii) The Aravalli hills running south-west to north-east starting from Gujarat and ending in Delhi;
(iii) The eastern plains with rich alluvial soils; and
(iv) The south-eastern plateau. The state has well identified 10 agro-climatic zones. The state is endowed with diverse soil and weather conditions comprising of several agro-climatic situations, warm humid in south-eastern parts to dry cool in western parts of the state.

About 65 per cent population of the state is dependent on agriculture and allied activities for their livelihood. The state is having 42 KVKs spread over across 33 districts in order to guide the farmers in the state.

Strength

- KVK's contribution to farming communities – mutual coordination,
- Introduction of wide range of new practices and methods of cultivation,
- Community participation in KVK's activities,
- Contribution towards vocational training to rural youths

Weakness

- The climatic condition of the state,
- Lack of infrastructure in many KVKs,
- Absence of latest machineries and farm equipments in some KVKs,
- Shortage of technical staffs in many KVKs,
- Inadequate financial resources to cover wide spread district areas,
- Frequent transfer and posting on deputation of KVK staffs under SAU KVKs.

Major recommendations

- Staffs under NGOs category KVKs are getting differentiated pay and allowances which is not matching with other KVKs. An equal pay structure should attract the scientific staff in KVKs,
- There should be periodic monitoring and evaluation of KVK's activities and performances to strengthen its functioning,
- Units of warehousing & storage and processing should be established to support farmers,
- There should be minimum autonomy in functioning of the KVKs which are functioning under SAUs. It is getting undue delays in many sanctions and approvals,
- Incentives and subsidies of the line departments may be routed through KVKs for success and efficiency.

6.5 Tamil Nadu

Tamil Nadu is one of the developed states in terms of agriculture as well as industry. The state has registered 7.93 percent growth rate in agriculture during 2013-14. This robust growth in agriculture has boosted the overall gross domestic product (GDP) of the state to 6.13 percent for the year 2013-14. The state has achieved record food grain harvest of 103 lakh tones during the same period (The Hindu, 2014). Adoption of new technology, mechanization in agriculture and use of higher yield variety of seeds are some of the factors which changed the agriculture into a better performing sector. Continuous support by the state government and dissemination of technologies by the KVK are the major source of transformation of the sector in the state.

The State has 30 KVKs out which 10 KVK have been personally visited for this study. It was observed that, KVK role is very important among the farming communities in the state. Farmers are of the opinion that, the scope and coverage of the KVK should be expanded to benefit all the farmers. Almost all the KVKs in the state are relatively better equipped and resourced. However, NGO categories KVKs are facing some kind of resource crunch due to limited allocations of funds.

Strength of KVKs

- Awareness and active participation of farmers in KVK's activities,
- Better socio-economic status of farmers,
- Reach of the disseminated technologies and improved practices to great extent,
- Adoption of KVKs' disseminated technology,
- Favorable economic and climatic conditions to adopt new technology,
- Increasing demand for agricultural products,
- Market potentials/opportunities through KVKs,
- Better cooperation between farmers and KVKs,
- Additional flow of funds and schemes through KVK in the state,
- Move towards organic farming and huge demand for such products,

Weakness of KVKs

- KVKs under NGOs are facing resource crunch on the other hand KVKs under State Agriculture Universities are overloaded with too many schemes and projects to implement,
- Unequal pay and perks to Subject Matter Specialists (SMS) of different categories of KVKs,
- Delays in approving and sanctioning of budgets – creating delays for front line demonstration season time,
- Lack of continuous monitoring and support mechanism to get better yield,
- Increasing role of private agents and sellers to be regularized,

Major recommendations

- Few more low or middle level technical staffs should be placed under each SMS for continuous support and better performances and continued interaction with farmers,
- Differences in pay structure and other provisions among types of KVKs. NGO category KVKs are facing problems in getting experienced faculties due to this difference in pay,
- More latest machineries and farm equipments should be made available at KVKs for the use of farmers,
- More and frequent exposure visit for farmers,
- Periodic meeting of farmers and farm women should be organized at villages instead of KVKs –this will attract and reach more farmers,
- Procurement centres should be created in KVKs to procure the farm produce directly from farmers at reasonable price,
- This chapter is based on the information collected through focus group discussions with KVKs as well as farmers.

Chapter 7

Result Highlights and Discussion

7.1 Result Highlights

7.1.1 KVKs Perspective

Chapter 4 and 5 provide detailed results about the surveys conducted of KVKs and farmers. Chapter 6 details the observations and interactions outcomes of the Focus Group Discussions convened in about 42 districts. This chapter highlights summary of findings and discussions. The results have been discussed here in the light of the conceptual framework of the study and in response to specific objectives. The highlights of the results are:

- Almost all the selected KVKs reported that agricultural crops, horticulture and veterinary and animal sciences were the focus areas of their activities. Half of the KVKs also referred to fisheries sciences and forestry as their focus.

- In general the KVKs are short of staff at all levels – to the tune of over a quarter among Scientists (23%) and Technical Support staff (22%) and about 86 per cent among other staff

- KVKs have reported that they are fully or partly satisfied regarding sanctioned infrastructure facilities. However, in a number of KVKs infrastructure is not available as per norms especially staff quarters, hostels, equipments etc. Human resources are also not adequate. Some KVKs are functioning in rented accommodations and have no place for display or organization of trainings.

- On an average, each KVK covers 43 villages and 4,300 farmers annually. KVKs under NGO management have moved ahead much faster than the other types of institutions.

- About 80 per cent of the villages covered were over 10 km away from the office of the KVK. Another 10 percent were within 5 to 10 km away. During the FGD it was brought out that due to resource crunch most of the KVKs are catering to the needs of villages located in the vicinity.

- Off-campus activities are more than on-campus activities. The data also show that KVKs are concentrating more on individuals than the groups.

- KVKs are responding well to requests from farmers for information- attending to 96 per cent of the requests received in a year. The KVK also responds to requests for seeds and planting material, quality animals and assistance in implementing technologies reasonably well covering more than three-fourths of the requests. However, in the matter of requests for demonstrations, the response percentage is only 40. State wise variations have been observed.

- Out of the total number of 1812 technologies transferred, 1165 related to agriculture, 383 to horticulture, 138 to animal science, 89 to home science and 37 to fisheries.

- Most of the KVKs felt that rich farmers, those located near the KVK, those with secondary or higher education and those whose land holdings were comparatively large were more likely to implement new technologies offered by the KVKs. While the linkage between richness/poverty and proneness to adopt technologies and that between size of holding and proneness to adopt is strong, the effect of education on proneness is somewhat weak. It is perhaps the resources to adopt that matter more than education.

- 42 per cent of the technologies adopted resulted in higher productivity and reduction in cost and wastage. About a third of the technologies led to quality improvement and enhanced incomes. One fifth of the technologies proved to be time saving and less labour intensive and therefore led to drudgery reduction. The remaining 8% boosted confidence among the farmers.

- Enhanced incomes are spent on better education of children, accessing better health services or constructing a house and also in purchasing better inputs for agriculture. Some farmers spend the additional income in marrying their children. Some improper use of the additional income such as purchase of alcoholic beverages was also reported.

- On an average each KVK trained about 100 persons annually through their entrepreneurship development programmes. By type of KVKs it seems that KVKs under ICAR and NGOs are training more persons. But coverage of females is more in case of NGOs and SAUs.

- About a quarter of the persons trained start some self employment venture. Trained females form SHG and start economic activities after training. Women trained by NGOs have the highest percentage of business starters after training.

- It may be seen that about 60% of the 48 KVKs covered provided some form of escort services or other to those farmers who took up self-employment.

- on an average about 25% time each is devoted to non mandated agri activities and non mandated non agri activities

- KVKs reported an edge over other organizations providing technology services in terms of having demonstration units, a team of technical experts in varying disciplines, advice to the farmers under one umbrella, use of ICT and provide mobile advisory services.

- Factors that hamper technology transfer and adoption inter alia include difficulty in getting suitable technology, non-availability of any backup of technology if required by farmers and KVK scientists are not able to reply them, lack of input delivery system and availability of planting material and other farm inputs, poor socio-economic status of farmers and small holdings, non-availability of low cost technologies, lack of forward and backward linkages especially post harvesting management, marketing and value addition etc.

- Most of the KVKs were of the opinion that a number of technologies were gender sensitive and had helped in reduction of drudgery, income enhancement and developing self-confidence among women thus making them empowered.

7.1.2 Farmers' Perspective

- Survey covered farmers of all the age groups fairly uniformly except in the age group of 15-24. Most of the rural youth in this age group are either studying or working in non agricultural pursuits. An interesting point observed is that the share of females gradually declined as the age advanced.

- More than half of the farmers had some sort of farm machinery. The ownership of farm machinery increased with size of holdings with over 90% of farmers in 10 hectares and more land having farm machinery. Small and marginal farmers have small implements while big farmers have all sorts of farm machinery. State variations observed.

- Families involved in agriculture and non agriculture both types of activities have better incomes as compared to those involved with agriculture only. For those farmers without any other activity the average income was Rs. 125,000/- per annum while for those with other economic activities the average was Rs. 212,000/- per annum.

- About 28% farmers covered were not aware of the existence of the KVKs or their activities.

- One in six (16.3%) of the farmers surveyed had no knowledge whatsoever about dissemination of knowledge on technologies by KVKs

- Farmers with small holdings had relatively less awareness about KVK activities.

- Proportion of those with no knowledge about KVKs and their activities being highest for farmers with primary or below education and gradually falling with higher educational levels.

- KVKs have limited outreach and catering more to the needs of big and progressive farmers

- Where ever ICT and media is used technology transfer is fast and effective

- KVKs are the front runners among other organizations with half of the farmers acknowledging that training and demonstrations organized by those institutions accounted for the technology transfer.

- About 40 per cent of the farmers reported that they had implemented the technology soon after they learned it and about one-fourth did so from the next agricultural season.

- Role of fellow farmers is important in spreading new technology

- The proportion of farmers enjoying that benefit goes up as the educational level increases

- More than 80 per cent of the farmers stated that they had made changes in their agricultural pattern after intervention of KVKs. These changes usually were in diversification of crops and changes in cropping pattern, and use of fertilizers and pesticides. Some farmers reported changes in machinery used and in water use pattern. A much larger proportion of the farmers in the beneficiary group (93.7%) had changed their farming methods during the last five years than the comparison group (62.7%).

- On question about increased production and incomes of farmers, over one-third of the farmers did not choose to respond to this question. However, among those who responded, a large proportion (about 75%) reported increases of over 10 per cent both in production and incomes. In production and incomes the increases in the case of farmers in the comparison group lagged behind those for the beneficiary group.

- For making KVKs more effective farmers indicated that the present activities and mandate needs to be reviewed and expanded.

- Systematic cultivation process, seed planting technique, water management are the areas which benefited farmers most. Integrated farming system, feed management and proper use of chemical fertilizers are the other techniques which benefited farmers.

7.2 Discussion of Results

The conceptual framework has been given in Chapter 3 where a Theory of Change (ToC) has been devised. A sequential chain as indicated in the ToC has been validated through the results. Results indicate that from inputs to activities and activities to outputs there is a direct causal link which indicates the 'attribution' connect. The exemption behind this aspect had been timely availability of resources with KVKs and active participation of target groups in various activities which in general have been found to be achieved. In some cases, it has been observed that where resources are scarce or farmers are unable or unwilling to participate in various activities, the results of outputs are difficult to achieve. KVKs have expertise so far technical knowledge in various agro-related fields is concerned, officials are capable of providing training to farmers, infrastructural support ranges from inadequate to adequate and inputs in terms of new and emerging technologies are available with KVKs in general. These inputs helped in organizing various activities by KVKs which resulted in direct outputs in terms of OFT, and FLD, farm development in the premises of KVKs for display and training, technology transfer and advice to farmers.

The collaboration with other departments by KVKs in general has also been observed. Up to this level it can be concluded that KVKs are able to achieve the outputs to a great extent according to their objectives and mandates. When it comes from outputs to outcomes, the study indicates that KVKs are playing an important role in achieving the outcomes and their role can be termed as 'significant contribution' or as a main contributing factor because the study reveals that as per the perceived ToC farmers are adopting the new disseminated technology, they are able to use their resources optimally, their technical knowledge has enhanced, women have been empowered and the spillover effect of the new technology has also been observed as the success of new technology disseminated to some farmers is being seen by other fellow farmers and they are also adopting the same. This indicates that the assumption that farmers will be willing to use new technology and new knowledge and will have accessibility to the new technology has been validated to certain extent. Here the results show only the 'contribution' and not the 'attribution' because there are a number of other intervening variable that are playing important role. KVKs are one of the organizations imparting extension services and similar outcomes from other organisations cannot be ruled out. Again when the impact of interventions of KVKs from outcome to impact has to be determined, there are a number of influencing factors which have their role.

There are intended or unintended impacts of these factors. It has come to the light through this study that even when certain technologies were successful at field level, the impact in terms of enhanced productivity or incomes could not be achieved because of floods or droughts; floods and droughts had been the intervening influencing factors which came in the way of achieving the intended impacts. An attempt was made to study the long term impacts of interventions made by KVKs. The results show that in some cases the quality of life has improved as the enhanced income is being used for better education of children, accessing better health services and spending money in assets creation, etc. While in some other cases such type of results could not be achieved as enhanced incomes were used appropriately. In many families the higher incomes were being used in drinking, smoking, spending on social events, etc. It may be seen that the social and traditional factors and habits influence the intended impacts. Similar assumptions were made while establishing the ToC.

The results indicate that large farmers have various types of farm machinery, especially tractors and other big machines. On the other hand, small farmers do not have any machinery or few small implements. These results are understandable in the light of the fact that small and marginal farmers cannot afford to buy machinery due to the higher cost involved. They generally use small implements or hire from big farmers. These results can be seen together with the average income of farmers which indicates that incomes of small and marginal farmers are much less than that of the big farmers. Results also indicate that the families who are involved in other economic activities along with agriculture are prosperous as compared to the families that are involved only in agriculture.

Farmers with small holdings are relatively less aware of the services provided by KVKs as compared to big and progressive farmers. This shows that KVKs have not been able to provide services to the small and marginal farmers up to the desired extent. NSSO (2005) also indicated that all the extension programmes have a very limited outreach. To cater to the needs of small farmers, there is a need of skill people at operational level so that they could handle day-to-day problems and guide farmers as per area specific needs. Small and marginal farmers also do not have easy access to technology advice (Agrawal et.al. 2012). The results indicate that operational level technicians should be posted with KVKs. Small holdings also face new challenges on integration of value chains, liberalization and globalization effects, market volatility and other risks and vulnerability, adaptation to climate change, etc. (Thapa and Gaiha, 2011). The present study also brings out the need for technical support at operational level and assist in development of value chains if the technology transfer has to be impact oriental.

The KVK services are limited to training programmes on farm trial and field demonstration and do not come as a complete package while farmers require the services in a complete package that include forward and backward linkages. The results of the survey and interaction indicate that technology adoption has a limited success if the new technology and inputs are not available or accessible and also if the post-harvest technology assistance in marketing, etc. is not available. KVKs are not able to meet these demands of the farmers. The

other studies conducted on these issues (IFPRI, 2010) indicate the same pattern of results. There is an immediate need to review the mandated activities of KVKs.

The role of mass media and information and communication technology (ICT) has been found very useful in disseminating the new technology in agriculture. It has been found that the KVKs that are collaborating with mass media or are using ICT have been successful in transferring of technology with a wider coverage of farmers. Such efforts should be incentivized and promoted if the effectiveness and efficiency of KVKs has to be enhanced. Chapman and Slaymaker, 2002, Gandhi et al. 2009 researches indicate that ICT has better outreach with a faster rate and there is a higher adoption rate with video or electronic media extension approaches.

The results of the study indicate that there is a need to have intervention not on individual basis (farmer level) but at group/ family level where the needs of the families are taken into focus, for example, the adult males involved in farming should be provided with latest technology while youth and women folk should be provided entrepreneurial training. In this way, on one hand women will be empowered socially and economically, youth will be able to establish value chain by establishing micro enterprises using agriculture produce. Agrawal et.al. (2013) in their study on Human Resource Planning brought out that youth is more interested in allied sectors of agriculture like bee keeping, food processing, agro-based industry, etc. as compared to cultivation. Youth with education in agriculture related field could be a source in changing the shape of agriculture. It is high time that educated youth is picked up for training for rural industrialization in which KVKs can play a very crucial role.

The results show that technology transfer had been effective and efficient wherever there are farmers' clubs, farmers' associations and other farmers' groups continuously interacting with KVKs and other extension personnel. The results of the present study also reveal that the learning from fellow farmers had been very effective. The work done by Collion and Rondot, 1998 study states that farmers' associations play useful role in extension and also work with research and extension organizations for demand-driven and client oriented extension services.

7.3 Research Needs

During the study some of the further research needs have been identified which have been mentioned in chapter six where district wise details have been given. Here efforts have been made to highlight some of the researches that are needed in general.

- Agriculture in the country in general is monsoon dependent. Climatic changes are also threatening the traditional agriculture. Research is needed for short duration varieties of crops that can withstand the vagaries of nature.

- Many areas in the country are drought prone. Irrigation facilities are scarce. Farmers need seeds that require less irrigation.
- Use of hybrid varieties of seeds, fertilizers and pesticides has enhanced the cost of production. Cost has also increased due to mechanization. There is a need to research as to how to cut the cost of production so that agriculture could be cost effective.
- Feeding technology for animals in droughts and scarcity conditions needed
- Research on preservation of Mushrooms
- Suitable technology and machines for small farms
- Treatment for saline soils
- Technology for preservation of Sugarcane Juice

7.3.1 State wise research needs highlights

Arunachal Pradesh:

Aromatic rice variety introduced in Papumpare could not get success as its aroma attracted a number of insects and pests. The variety requires modifications and further research to tackle the problem.

New technologies in certain areas are very costly like protected cultivation which requires poly houses. Further research in low cost protected cultivation will be useful.

RCM 76 maize crop which was successful in Nagaland failed in Dirang. Available technology for Maize needs to be modified as per local area climate.

Cultivation of oranges, Kiwi fruit and pineapple is in abundance in Dirang . Technology is needed by farmers for processing, packaging and marketing of these products.

Madhya Pradesh:

New varieties of seeds which require less irrigation are needed in the areas where irrigation depends upon Monsoon.

Low cost varieties of pest resistant and high-yielding seeds to reduce the cost of farming, and increase yield

Rajasthan:

Crops which require less irrigation and more output are needed.

Tamil Nadu:

The problem of disease in papaya plant is continuing. Research is needed to control various types of diseases in Papaya.

Some technologies are not successful like CO-45 rice variety (is slender type while farmers want thick variety); a variety of blackgram (VAM3) is susceptible to yellow virus diseases; Power weeder in paddy is not functioning properly; CR1009 rice variety is although a high yield variety but it is a long duration variety; New research is required in these areas.

In hydro-phonix technology more advancement needed

Some new variety of bottle guard (CO1) could not fetch good market price hence it was not successful. More research is required to bring out varieties suited to the region.

Maharashtra:

Technology regarding checking moisture in groundnut crop is needed.

A number of researches needed in the Konkan region as the region is different from other states these include research in providing implements for processing of cashew nut, mangos, etc.; tender cashew-nut can be used in preparing vegetable. The technology for the preparation of powder of cashew –apple which is useful for medicines should be developed; Kokum processing can also be done in this area, but no technology is available. Due to rain, the crop of Kokum gets waste. Kokum powder is also useful for medicines; Technologies are required for organic farming in mango, coconut and cashew- nut; Power tillers available are not suitable for this area. Research needed in making power tillers with gears (not with chains) which could work in mud is needed. There are small land holdings and hilly terrains Therefore, machinery and equipment available for agriculture in plains are not suitable to this region. Mechanization should take place accordingly and small implements should be made available. Rice planter from China which is suitable for hilly areas will be useful. Research in such kind of machinery is needed.

Research is needed for preservation of sugarcane juice as sugarcane production is in plenty.

Farmers also require technology to set up agro-based industries.

Chapter 8

Key Recommendations

Chapters 4 and 5 provided results of surveys conducted under this study and chapter 6 highlighted the outcomes of Focus Group Discussions at district level. These chapters analysed the .observations in detail and provided district wise recommendations and action points. A number of recommendations are common across KVKs while some are state specific. The latter have been indicated separately in these chapters. Chapter 7 discusses the results and brought out explicit or implicit reasons supporting various results. In the present chapter a summary of main recommendations and action points that have emerged from the study have been outlined under two sections detailing major themes in each section. The first section relates to improving performance of KVKs within pre- set mandate and the second section provides vision for future.

It is important to mention here that there are some recommendations that have been made as these came to light during field work and are important for effectiveness of KVKs but these are out of purview of KVKs activities and also the Study team. These get a mention here as target groups of study insisted to place these recommendations on record.

8.1 Improving Performance

8.1.1 Infrastructure and Resources:

Adequate infrastructure and resources, both in human and monetary terms, provide the essential base for carrying out various activities. Lack of adequate infrastructure and resources is likely to hamper the smooth, timely and effective interventions resulting in non- attainment of goals and impacts of interventions made. During the study it has been found that while some KVKs are well equipped some others neither have good infrastructure nor other resources. There are instances where officials have not received even their salaries for more than six months. In such a scenario any expectations of good outcomes will be hypothetical. Recommendations on these aspects that should be paid attention are:

- There is at present a uniform pattern of distribution of staff and resources across KVKs. The study suggests that resource distribution should be as per the specific needs of the KVK taking into account the geography of the area, location of KVK, local problems and prospects. For example, backward districts or hilly areas have different sets of problems as compared to other KVKs. Allocation of budget and other resources cannot be uniform.

- More frequent field visits are needed during the agricultural season which requires not only human resources but also financial resources. KVKs should be strengthened by adding more field staff exclusively for extension visits. It has been observed that a number of posts are vacant and there are a lot of anomalies in postings. For example, in one case no driver has been posted but a vehicle is available whereas in another there is no vehicle but a driver is posted. Similarly, in the districts which have vast potential for horticulture development there is no SMS for horticulture and where there is no potential for animal husbandry, SMS (veterinary) has been posted. In some KVKs there are, for example, good laboratories and equipment for soil testing but there are no technical assistants posted. Resources are scarce and should be utilized optimally and with great care.

- Over the years there is a reduction in budgetary allocations which is leading to reduction in the coverage of the KVKs' activities. To make KVKs effective, adequate budget should be allocated. There are also delays in sanctioning of budgets which leads to financial crunch hampering the activities. This is truer in case of KVKs under SAUs. The channel of resource flows from ICAR to regional office to SAU and then to KVK is indeed long and takes substantial time. This aspect should be looked into. Innovative KVKs can be provided better incentives in terms of financial and other resources.

- Training is one of the mandated activities of KVKs but the budget sanctioned for this purpose is not adequate; per day allocation/allowances for farmers/trainees are too meager. Budget needs to be enhanced if training is to be effective. Farmers compare the KVK allowances with those available for ATMA programmes and are more eager to attend those and evince less preference to the KVK programmes. There should be to & fro transportation re-imbursement to the farmers to make the training programmes more popular and affordable.

- Majority of the farmers who were not benefited by KVK programmes feel that the inconvenient location of the KVKs is one of the main reasons for not accessing their services. Due to lack of transportation facilities and high cost of transportation they are unable to visit KVKs. KVK functionaries also do not cover many villages or undertake frequent visits, probably for want of requisite resources. Some arrangements for regular contact covering a large number of villages and farmers are essential to enhance the visibility of KVKs at field level.

- Inadequate and erratic power supply is a big problem in a number of KVKs and is affecting their efficiency. There needs to be a provision for alternative power supply through generators.

- KVKs that are in remote places and hilly and difficult regions need special consideration. Some incentives should be given to KVK staff in such cases.

- The KVKs that are willing to expand their activities beyond the mandated areas and undertake innovative programmes like establishment and maintenance of latest technology demo units, ICT cum Museum, etc. find the regular budget insufficient. Incentives in the form of additional need-based resources would encourage such initiatives.

8.1.2 Technologies from Labs to KVKs

There appears to be some confusion among various KVKs regarding technology transfer from labs to KVKs. Some KVKs have reported that they do not get any information about new technologies and try to locate from internet; some others say that there is a prescribed procedure of getting the technologies. Only certified technologies can be transferred to farmers and scientists on their own cannot give any technology to farmers. Some others are of the view (generally KVKs run by NGOs) that they have to buy the technology which is a costly affair.

- There should be a uniform procedure to be adopted by all so far as transfer of technology by labs to KVKs is concerned. In case there is any prescribed procedure, training may be provided to this effect to all officials functioning in KVKs in receiving new technologies.

- Recently developed and validated technologies should reach KVKs at a fast pace. As it is now, by the time a new technology reaches the KVK and it is further transferred to farmers it is sometimes already obsolete or available in the market through input dealers or agricultural departments or through fellow farmers who are progressive and get to know of the technology during their visits to various places from time to time. A number of farmers innovate on their own and use new technology that comes later through researches.

8.1.3 Outreach of KVKs

In general, the visibility of KVKs needs to be improved at field level. Their coverage is limited under FLD programmes due to cluster approach. One or two days' training is not that effective. Sometimes training events are un- planned and untimely or organized to meet the targets. The training and participation is not always need-based. Same farmers attend training time and again. Generally these are progressive farmers or are those who come to KVK to take seeds etc. FLDs are conducted on selective basis in the fields of big farmers. There is need to

increase the visibility of KVKs at field level. A number of measures can be adopted to increase the outreach of KVKs.

- There could be a national publication elaborating the activities of the KVKs and its innovations for mass awareness which should be disseminated at each Panchayat level in local language.

- KVK should initiate awareness programmes through advertisements using print and electronic media, mobile phones etc.

- Farmers committees can be constituted at a 'group of villages' level which should have representatives of big, small and marginal farmers from each village. A plan of continued interaction should be chalked out between these committees and KVKs. Some KVKs are interacting through Farmers Clubs, Farmers' Associations which is fruitful but such interactions are again limited.

- Farmers to farmers dissemination of technology is an innovative technique which should be replicated by all KVKs and it should be ensured that farmers are able to transfer the technology to other farmers. Farmer-trainers should be trained by KVK at a large scale and follow up should be done for further dissemination of technologies.

- KVKs are located either in district headquarters, or in a village abutting the outer peripheral boundaries of the district. So, the farmers from the other end of the district are finding it difficult to travel more than 100 km distance to consult KVK. Nor is the KVK able to conduct training programs or FLD etc. in those far off villages. Therefore, farmers are demanding extension centre of KVK near their villages in order to access the expertise of KVK. This is the demand from almost all the districts.

- Generally training programmes are organized in the premises of KVKs. There is a need to organize such training at village level to have a better outreach and targeted farmers. Training material needs to be distributed in local language. Some KVKs have power point presentations with pictures etc. which is a good initiative but these presentations have been prepared in English. This aspect should be looked into.

- KVK staff should organize regular village level meetings, demonstration camps, crop oriented and need-based on-farm training.

- The non-benefited farmers feel that KVK staff is not visiting their villages. They do not understand the cluster approach and complain about it.

- KVK should organize more relevant training programmes, workshops, conferences, demonstrations for various stakeholders, namely, agriculture officers/ supervisors, dealers/ distributors of seeds, banking personnel, Anganwadi women, school students, etc., on seed treatment, crop storage and packaging practices, techniques of hi- tech horticulture, fruit preservation, etc. This will lead to spread of technology horizontally in the district, increasing awareness among farmers about improved farming practices, raising income/ income generating activities and will give better visibility to KVK.

- KVK Radio range should be increased to reach farmers in the far off places as they cannot come to KVK personally and most of the farmers in remote areas depend on KVK broadcasts.

- A number of farmers are interested in growing new crops like Alphanso mango in Ratnagiri area, but they are not aware of the technology, management and post-harvesting. There is a need for KVKs to display technologies based on local needs using video or other electronic media in various villages.

8.1.4 Non-Mandated Activities

KVKs have limited staff and their main function is transfer of new technology at field level. Apart from this mandated activity, they often perform various non-mandated activities. Some of the non- mandated activities relating to agriculture like helping in getting bank loans for starting micro-businesses, participation in knowledge dissemination camps, assisting in formation of SHG or farmers clubs etc. are support the mandated activities of KVKs. However, it has been noticed that substantial time of the KVK staff is also spent in activities unrelated to agriculture like repeated filling up of information on various forms and so on.

- KVK should be exempted from un-productive duties.

- Here it is important to mention that most of the farmers do not understand and differentiate between mandated and non mandated activities and therefore look at KVKs for every type of problems.

8.1.5 Policy Issues

The study has brought to the fore a number of issues affecting the impact of KVKs that require action at policy level. It was observed that these issues are important and directly or indirectly relate to adoption of new technologies by farmers. These issues and suggestions are mentioned below although some of these are not directly related to KVK functioning..

- Government is giving subsidy on chemical fertilizers to farming community but the production and use of organic fertilizers is not receiving adequate attention. The farmers engaged in organic farming should be encouraged by giving appropriate incentives.
- Farmers have reported problems of intrusions by animals like monkeys, pigs, *neelgai* etc. that destroy the crop. The problem has been reported in a number of states. There is a need to fence the farming area or cast nets to control these animals. Farmers want that some subsidy be provided to them for this purpose and KVK could assist in this work. This work can be got done under already existing schemes such as MNREGA.
- A number of new agricultural researches are continually taking place in the country as well as outside. KVK officials should keep pace with the new developments and should update their knowledge. There seems to be no policy in place for in -service training of KVK scientists and other technical support personnel. There is an urgent need of capacity building of KVK staff. A training policy should be adopted and staff provided need-based training. It was observed during the study that some of the farmers had more up- dated knowledge than KVK personnel.
- The career advancement promotion and transfer policy for the staff of KVK needs a re-look. There is no career advancement for the scientific staff of KVK and that is one reason why the scientists do not want to join this organization while some others are leaving it. It was noticed at many places that there were frequent transfers of the personnel that affects the efficient functioning of KVKs. Some policy decision should be taken so that an official should serve in general at the same KVK at least for five years to enable him to understand the needs of the local farmers and respond to them effectively.
- Some differences have been found in the working conditions and facilities available to officials of KVKs functioning under ICAR/ SAU and under NGOs. The staff under NGOs is not being treated at par with the officials functioning under ICAR and SAUs. They also do not receive fringe benefits. This aspect should be looked into. It needs to be mentioned in this context that some of the KVKs under NGOs are doing excellent work. But, lack of adequate service facilities de-motivates the officials.
- To give more field assistance to farmers there is a need for more middle and lower level extension workers with practical knowledge for guidance and regular contact and follow ups and also cater to the needs of small and marginal farmers on regular basis.
- Minimum support price should be fixed on the basis of the cost of cultivation. Price of the product should be declared before the sowing of the crop so that farmers who cultivate the particular crop are well aware about the profit which they will get in producing a particular crop.
- For crop insurance there is a rule that if 50 per cent farmers will be affected then only insurance will be given while insurance should be individual farmer based, there is a possibility that some farmers are affected more than others even if 50 per cent loss in the entire area is not there. This anomaly should be looked into.

- A regulatory authority should control distribution of inputs at Panchayat level. At present some farmers get more quantity of inputs while some others do not get any. The subsidy on fertilizer and pesticides should be on limited quantity which will check their excessive use. In case some farmers need more such inputs they can buy from the open market. The subsidies should be given according to the land holdings.
- Another important issue raised by farmers was regarding subsidy on fertilizers. They informed that for buying subsidized fertilizers distributors are defined, they sell the product at higher price than other distributors; they suggested that the farmers should be free to buy it from any distributors.

8.2 Vision for future

KVKs can play a pivotal role in the districts as an agent of agricultural change by coming out from the inside the wheel approach. Some of the recommendations to this effect are as below:

8.2.1 KVKs as Resource Centers

One of the major problems that restrict popularity and effectiveness of KVKs is that their mandate is for providing advice on various issues relating to technology or to show the effectiveness of a new technology. The KVKs do not provide any inputs to the farmers nor do they facilitate the access to various inputs for adoption of new technology. The farmers always compare the activities of KVKs with those of other agriculture related departments, NGOs, ATMA, etc. that provide assistance in getting various types of inputs. A number of suggestions emerged to this effect which are:

- Technology transfer should come a complete package covering backward forward linkages to make it adoptable and effective.
- KVKs should be declared as resource centers for all agri-related activities. They should play a pro-active role in providing various agricultural inputs or providing guidance about accessibility of inputs. It was reported that private dealers provide inputs at a higher rate.
- The seeds given by the Government functionaries are not of good quality as 15 % out of the total quantity is a waste. KVK as a resource centre should be the nodal agency for ensuring good quality seeds.
- There should be a provision of soil testing modernized laboratory with scientific staff and other equipments in the KVK. More sophisticated equipment is needed to reduce time of testing and provide instant results to farmers. Sophisticated machines should be placed in KVKs so that analysis of micro nutrients in the soil could be tested. KVKs should establish soil testing laboratories at Panchayat levels so that at the time of need instant

results could be provided to farmers or at the time of sowing season camps may be organized by KVKs at local level for soil testing. Another option can be to provide soil testing training to youth in the villages and provide them with a testing kit which will not only help farmers to get their soil tested at their door steps but also provide jobs to youth.

- Custom hiring of agricultural machinery/equipment has to be strengthened in each block as medium and small farmers are unable to hire the equipment from private vendors who are charging exorbitantly on hourly basis for all the machinery. In many districts the system of custom hiring is centralized with only one custom hiring centre for the entire district, and it is difficult for farmers of far off villages to access the equipment from district headquarters. Machinery and equipment should be provided to farmers through KVK at subsidized rates or on hire basis. A system should be evolved so that various types of machines and equipments are readily available to the farmers at village level. Custom hiring centre can be established at block level and this centre should function under the KVK.

8.2.2 Operation, Implementation and Coordination

- There is a multiplicity of organizations that are providing extension services to the farmers. At many places overlapping of activities has been found. While in some KVKs work is organized in full cooperation and coordination among various organizations, at others there is a total lack of coordination. To tackle this problem KVKs should be declared as nodal agency for all the extension work and there should be a close coordination and delegation of responsibilities between all the departments at all levels.
- KVK's visibility at field level is restricted. One KVK in each district cannot cater to the needs of all the villages and there is a great demand that one KVK each should be established at least at block level. Till such expansion takes place, KVKs should, while following a cluster approach, adopt some villages from each block of the district. That would facilitate transfer of technology at a faster rate because spill over impact of activities of KVKs has been observed. It is also suggested that while KVK adopts certain villages for FLD, for training purposes they should invite farmers across the district. Till now transfer of technology and other activities remain confined to the concerned or a couple of villages only. Sometimes no other farmers are present at the time of FLD except the farmer on whose farm the demonstration is going on. This is giving poor visibility to the organization.
- The KVK gets technology very late. By the time KVKs get a technology either it is obsolete or is already available to the farmers through market. Some technologies need license to implement which is a very time consuming process. Some KVKs functioning under NGOs have reported that they have to buy technology which is a very costly affair. An efficient system of technology transfer from lab to KVKs has to be evolved if KVKs

have to function as efficient organizations. A Technology inventory should be maintained and approved technology should be on easy domain so that KVKs can access it.

- It was suggested that there should be free access to KVKs in 'Cloud network'.
- Kisan radio program is very popular among farmers. They should also get opportunities to share their views with the subject expert. The TV channels that broadcast agriculture related programmes should be properly advertised and broadcast should be in such a way that adequate guidance is provided to farmers at the time of sowing, cultivation, harvesting post-harvesting, etc. Recently Kisan Channel has been started. It can provide a good platform for technology transfer at a faster rate. KVKs should have continuous link with this channel.
- Technology related campaigns, exhibitions and discussions should be organized at field level on frequent basis by KVKs. Weather related information should be shared by KVKs through block headquarters.
- Farm labourers should also be given training in agricultural operations so that the skill base of agricultural workforce may be developed. Mini kits are provided to farmers; they should also be given to agricultural labourers.
- KVK should provide crop-wise training to the farmers from sowing to packaging and marketing of produce. This will help farmers in better marketing their production, reducing the influence of middlemen thereby increasing profits. Farmers suggested that each village should have storage and a market for sale of agriculture products.
- Cultivation should be as per local demand. Farmers' groups should be organized for cultivation of specific crops and linked to marketing. When Mandis are not available even at district level it is difficult for the farmers to market their produce.

8.2.3 Farmers' Needs

There is a need to review the range of mandated activities of KVKs. KVKs need to function in a manner that helps farmers and solves their day to day problems. Their activities should be based on local area needs and not a uniform pattern all over the country so as to cater to the diverse socio cultural and traditional systems across states. Some of the problems that can be addressed by KVKs are detailed as follows:

- Agriculture is becoming mechanized. Training from KVK is needed on how to operate various machines, their upkeep and minor repairs. The youth from the villages can also be provided training for repair of various agricultural implements. This will provide jobs to the youth and also help the farmers to get their machinery repaired locally.
- Activities of KVKs have to be farmers-friendly. For instance, in case of crop loss due to natural calamities, the revenue officials are assessing the loss arbitrarily without the involvement of agricultural experts. Farmers are of the view that KVK should be roped

into such assessments of crop loss it has the necessary expertise to gauge the loss of crops. This will help in getting legitimate compensation for the crop loss on the basis of rational assessment.

- A number of districts in states are very remote. Some are tribal dominated. Farmers here are uneducated and un-informed. In these districts farmers are misguided due to poor exposure to rules and regulations. They wanted that KVKs should help them, conduct orientation classes to educate them and explain the Government rules, subsidies, loans, and other facilities provided by banks and other organizations.
- There should be some self-employment avenues targeting the youth of the villages so that there is a supplementary employment throughout the year for the families having small land holdings. KVKs need to conduct need based vocational courses for youth. Some common courses across districts can be in processing, marketing, packaging, and entrepreneurial development. Some KVKs are organizing some vocational courses like training in tractor repairing that has helped youth in getting employment.
- Farmers have indicated some areas of their training needs. So far as technology adoption is concerned there is a need to provide training in cultivation of herbal plants, processing and export procedures. Better methods for vegetable cultivation should be popularized by KVKs. Farmers are demanding the technology of tissue culture and horticulture in poly-houses. There should be tissue culture laboratories to provide information about new bio-technologies interventions in agriculture and horticulture and planting material to farmers. The timing of training is also important. Training in the field should be provided to farmers in various areas during the sowing and harvesting seasons.
- Exposure visits to the places and farms where latest technology has been adopted should be planned, taking into account the needs of the farmers. Proper selection of farmers for these visits is necessary and training should be well-planned in advance.
- KVKs are no doubt providing training but there is no system of obtaining feed-back from the farmers and follow up action. There is a need to put in place a monitoring and evaluation system to ensure that the activities of KVK in this area are indeed effective.
- There is a need to introduce mobile veterinary clinic so that animal related problems can be attended within the villages. KVKs are concentrating usually on crops. Greater importance should be given to home science, post harvest management, and other up-coming fields like non-farm activities to promote employment and self employment.
- Sericulture is becoming one of the major commercial activities in certain pockets of various states. The technology has been disseminated by the KVK, but marketing is the area of concern. In Karnataka, for instance, farmers from different areas of the state have to organize themselves into groups for going to Bengaluru for selling the raw silk. Assistance in marketing or processing of raw material is required to make the technology successful.
- Climate change is forcing changes in cropping patterns. KVK has to play a pivotal role in disseminating relevant information to the farmers in this connection,

- As mentioned earlier KVKs should help to tackle the day-to-day the problems of the farmers. Since the farmers are mostly dependent on monsoons, provision of solar pump for irrigation would be useful in times of weak monsoon rains. For such kind of problems they expect assistance from KVKs.
- KVKs should assist in timely disbursement of subsidy on drip irrigation to the farmers.
- In the banana producing states, there should be manufacturing units to process the raw material of banana for making plywood and fiber. Similarly, other small processing units are also needed at village level depending upon the produce at local level. The KVKs can provide forward and backward linkages in this connection.
- It is suggested that KVKs should produce bio-products to control various pests and diseases. For example, some bio-products are needed to control the coconut pests. There is also a need to produce bio inputs like *Baevaria* and *Metarhizium* for distribution among farmers.

8.2.4 KVKs Role in Transforming Rural India

A number of steps have been suggested to enhance the visibility and effectiveness of KVKs in their efforts to fill the gap between agricultural research and practice. KVKs have to also play an increasing role in transforming not only agriculture but the rural scene in general.

- KVKs should plan their activities according to their relevance to different demographic groups of the audience. The interventions of KVK should target a) farmers of the age of 35 and above, b) women and c) youth between the ages of 18 to 34 with activities of different orientations. The older farmers should be told about latest technologies, seed production, etc. as they will not go out for any other work except agriculture. Youth should be given employment/self-employment-related training not only in agriculture-related areas like, fish farming, poultry dairying, bee-keeping, etc. but also in rural non-farm activities like processing, preservation, packaging and marketing of agri-produce to release pressure on agriculture. Such training can be imparted under National Livelihood Mission. After the training, groups of youth can be formed and all departments together should assist these groups to start self employment ventures. For example, there are water reservoirs (diggy) at the farms. The youth group can start fish rearing in these reservoirs. There is also demand for mushroom production and preservation. Women can form self help groups, thus, there will be three sources of earnings in family. Thus focus of the KVK intervention needs to be shifted from ‘individual’ to ‘family’.
- Adoption of a new technology poses a number of problems to the farmers at various stages from learning, acquiring necessary resources to implementing the technology, and the farmers need immediate solution to such problems on a day to day basis. This requires an effective system of feedback from the farmers and response from KVK for

better results and impact of transfer of technology. For example, in tribal pockets of the country, farmers produce organic farm products such as organic vegetables, pulses, cereals etc., but are not getting remunerative prices due to non-affordability of these products by local population. KVK should facilitate the transportation of such organic produce to district headquarters and nearby towns/cities where there is demand for such produce. Alternatively, KVK could arrange 'organic melas' in villages where the organic produce is on display and consumers from cities can visit and purchase the goods. Such melas could be organized in village clusters at least once in a month. This will mitigate the problems of transportation of goods by farmers to far off cities.

- KVK is yet to make its mark in Home Science activities though there is a sanctioned post of SMS (Home Science). KVK has to device training programs tailored to women households in areas such as horticulture, poultry, mushroom culture etc. KVK has not fully utilized its expertise towards women empowerment through self-employment avenues.
- Monthly farmers' meetings at various village clusters/ blocks should be organized to have a continued interaction and communication.
- In a number of districts farmers are educated; KVKs have to come out from their 'mandated mind set' by adopting innovative techniques for technology transfer. For instance, a small booklet containing technical details of various technologies, information on names and addresses of input dealers, product buyers and other market information should be brought out and distributed among farmers. Information about new varieties, new technologies, sowing times, etc. should be provided by KVK using electronic/ paper media.
- While technology transfer has become successful in the areas of agriculture and horticulture, the activity has great potential in fisheries, veterinary and development of poultry. KVKs should take initiative in these areas and show their visibility in technology transfer at village level.
- An all-India networking of KVKs is essential to make them effective. This would facilitate in understanding the activities performed by various KVKs, problems therein and the coping strategies. It would provide an experience sharing platform and a forum for learning lessons from each other.
- Periodic monitoring and evaluation of KVK activities is needed for enhancing their efficiency and effectiveness.
- Zone-wise technical backup team should be constituted by ICAR and made available for helping KVK in any emergency conditions (For example, in sudden appearance of any insect-pest/disease in the epidemic form on the crops/animals in the concerned area). The discipline-wise members of this technical backup team should be selected from KVKs/ICAR institutes of the related zone.
- KVK should also be given the work of validation of indigenous technology.

- To encourage more women to start Agribusiness special schemes for women should be considered and more facilities should be provided.
- KVK should develop 'ideal farms' like organic farming, nursery growing, floriculture so that all others could learn from it.
- Additional infrastructure facilities are needed for development of Technology Park, technology desk and visitors' gallery, etc.
- Farmers are educated and their training should be at the research stations so that they could grasp the technology better.
- KVK and farmers together should do researches as per local area needs. A number of farmers are progressive and they have innovated new technology. KVK also have scientists who have good qualifications; a combination of both may bring new technologies that would be beneficial.
- A number of farmers are doing various innovations that should be taken a note of. There is a need for following bottom-up approach and researches done at field level should also reach to laboratories for validation.
- There should be technical seminars and interactions at village level during the rabi and kharif season where scientists, KVK officials, state Government department officials, veterinary persons, cooperative societies, bankers, input dealers all should participate to facilitate farmers in adopting new technologies.
- There should be farmers' representatives in planning process.
- KVK should also train officials in local bodies.
- The result of the study indicates that rich farmers with big land holdings, farmers with better education and farmers staying near to KVK are benefitted more from the services of the KVKs. Impact of new technologies has not percolated to the small and marginal farmers and farmers living in remote and distant areas to the desired extent. The big farmers already have sources of information and KVK are also providing more services to them. It is extremely essential that KVKs cater to the needs of small and marginal farmers if impact of the technologies has to be assessed. Meetings with the farmers should be convened at village level.
- There are some KVKs that have manage their farm area very well and are producing a number of crops, seeds, etc. Incomes from the farms of KVKs be allowed to be deposited in the revolving fund to initiate various other activities at the end of KVKs.
- The district area is spread over 60-70 km and needs vast travel from one corner to other. Gender sensitivity and support is needed for travel, stay etc.
- Even though media is playing positive role in the district, there is a need to give agriculture development news on a regular basis. The details of technical know-how in agriculture should also get a place in the newspaper on mandatory basis.
- Farmers informed that though KVK is informing them about new technologies such as new seeds, fertilizers, drip irrigation, use of solar energy etc. which is helping in raising the production of crops but produce is not fetching appropriate market price. Due to low

price farmers are not very enthusiastic in adopting new technology. KVKs have to tackle this problem.

- Farmers also expressed their concern that they do not come to know about various schemes introduced by the Government for farmers' welfare. Information about all the schemes should be sent to Panchayat by the concerned departments.

The present study had four main objectives. Objective 1 of the study had been to study the efficacy of services. KVK is doing only frontline extension activities and it may not reach out larger percentage of farming community. KVKs are responding well to requests from farmers for information. However, response in dealing with the requests relating to demonstrations is to the extent of only 40%. KVKs felt that rich farmers, those with secondary or higher education and those whose landholdings were comparatively large were more likely to implement new technologies. KVKs carry out activities as per the broad guidelines for adopting villages and keeping in mind the resources. It has come to light that generally they cover the villages for their mandated activities in their close vicinity and villages in remote and far- flung areas remain uncovered. About one-fourth of the farmers covered were not aware of the existence of KVKs or their activities, especially those with low farm holdings and low education. Farmers generally were of the opinion that KVKs had very limited outreach. This finding may be seen in the context of KVKs mandate as they are only front line demonstration system. The results on objective 2 show that KVKs are short of staff and required infrastructure. A high percentage of vacancies are there in SAUs and there are more vacant positions in Maharashtra and Rajasthan. There are also problems relating to insufficient and untimely budget. Objective 3 of the study relate to transfer of technology and its adoption. The results show that average number of technology transfer is 7.5 per year by each KVK and about 64% relate to crop science and 21% to horticulture. Comparison group got information from fellow farmers indicating the spill over effect of technology transfer by KVKs. More than 50% farmers have mechanized their farm operations; the ownership of farm machinery increased with size of holdings; families involved in both agriculture and non-agriculture activities have better incomes as compared to those involved with agriculture only. The role of fellow farmers was found important in spreading new technology. The technologies relating to systematic cultivation process, seed planting technique, water management, integrating farming system, feed management, and proper use of chemical fertilizers were reported as having been beneficial to the farmers. The results on the objective 4 show that a larger percentage of farmers in beneficiary group reported an increase of 20% or more in incomes and production as compared to comparison group indicating the positive contribution to farm incomes through KVKs' technology transfer. Enhanced incomes are spent in construction of house, better education and health for family and better inputs for agriculture; some improper use of enhanced income has also been observed. A large proportion of farmers in beneficiary group changed their farming practices than the comparison group showing the influence of KVKs . KVKs have an edge in technology transfer over other service providers by virtue of their having better technical expertise and demonstration units. Most of the KVKs were of the opinion that a number of technologies were gender sensitive and had helped in reduction

of drudgery, income enhancement and developing self-confidence among women thus making them empowered.

In summary, the above discussion shows that while KVKs are playing a pro active role in transferring new technology at field level, a lot is yet to be done. It has also come to notice that KVK mandate has been looked into and revised. There is a need to look at the mandate of KVKs from time to time to keep the organisation need based and keep the pace of development.

References

Adhiguru P., Birthal P.S., and B. Ganesh Kumar (2009), Strengthening Pluralistic Agricultural Information Delivery Systems in India. Agricultural Economic Research Review 22

Aggarwal Abha and Pandey Arvind (2006): Lot Quality Assurance Sampling in Evaluation of Immunization Programme published in Biostatistical Aspects of Health and Population ISBN 81-7075-081-4

Agrawal, Rashmi, D. Rama Rao and Sachita Bhattacharya (2012). "Planning Human Resources for Inclusive Development of Small and Marginal Farmers", The Indian Economic Journal, Vol. 60(3), October-December 2012.

Agrawal, Rashmi., Joshi G.P., Indrakumar and Bhattacharya, Sanchita. (2013). "Human Resource Planning for Agricultural Growth" in Agriculture Education & Knowledge Management, edited by B.S. Hansra, P.K. Jain, Suresh C. Babu and V.K. Bharti. D.P.S. Publishing House, New Delhi.

Agrawal, Rashmi,2015. 'An Overview of Methodologies in Evaluation, paper presented in a workshop on Evaluation for Development of Equity and Equality' organized by Institute of Social Studies Trust, and NITI Aayog, New Delhi, April 16-17.

Agri. Census 2010-11,Agriculture Census Division Department of Agriculture & Co-Operation Ministry of Agriculture Government of India

Bamberger, Michael 2013,Introduction To Mixed Methods In Impact Evaluation, Interaction, the Rockefeller Foundation.

Birner et al. 2006; Biurner and Anderson 2007; Davis 2008; Hall et al. 2000; Kokate et al. 2009; Sulaiman and Hall 2008; Swanson 2009 Evaluation of Innovation Systems and Agricultural Research Programmes

Birner, R., and J.R. Anderson. 2007. How to make agricultural extension demand-driven? The case of India's agricultural policy. IFPRI Discussion Paper 00729. Washington, D.C.: International Food Policy Research Institute.

Chapman, R., and T. Slaymaker, 2002. ICT and rural development: Review of the literature, current interventions and opportunities for action. Working Paper 192. London: Overseas Development Institute.

Claire J. Glendenning. Review of Agricultural Extension in India Are Farmers' Information Needs Being Met? IFPRI Discussion Paper 01048 December 2010.

Clark, N., J. Smith, and M. Hirvonen. 2007. Livestock R&D in east and southern Africa: An innovation systems perspective with special reference to the International Livestock Research Institute. International Journal of Technology Management and Sustainable Development 6(1): 9-23.

Collion, M-H., and Rondot, P. 1998. Partnerships between agricultural services institutions and producers' associations: myth or reality?' Agricultural Research and Extension Network Paper No.80. London: ODI.

Gandhi, R., et al. 2009. Digital Green: Participatory video and mediated instruction for agricultural extension USC Annenberg School for Communication 5(1): 1-15.

GoI, 2001. Tenth Five Year Plan Approach Paper, Planning Commission, Government of India, New Delhi

GoI, 2006. Eleventh Five Year Plan Approach Paper: Towards Faster and More Inclusive Growth, Planning Commission, Government of India, New Delhi

GoI, Union Budget of India, 2015-16 (February, 28, 2015)

ICAR National Bureau of Soil Survey and Land Use Planning (2005) Impact Evaluation: Methodological and Operational Issues, Asian Development Bank, 2006

IFPRI, 2010. 'Review of Agricultural Extension in India – Are Farmers' Information Needs Being Met? International Food Policy Research Institute Discussion Paper 01048, Eastern and Suthern Africa Regional Office.

Italia, 2010. Agriculture Education in India – Industry Profile 2010. The Italian Trade Commission, Kolkata. Taken from www.ice.gov.it.../India..../Agriculturalper cent20Mechanizationper cent20inper cent20India-per cent20 profileper cent202010.pdf.

Naresh Kumar, 2010. 'Indian Network of Climate Change Assessment (INCCA)'

NSS, 2003. 59th Round. Situation Assessment Survey of Farmers Indebtedness of Farmer Households (Report No. 498(59/33/1)

NSSO (National Sample Survey Organisation), 2005. Situation assessment survey of farmers: Access to modern technology for farming, 59th round (January-December 2003), Report No. 499 (59/33/2). New Delhi: Ministry of Statistics and Programme Implementation

NSSO (National Sample Survey Organization)), 2005. Situation assessment survey of farmers: Access to modern technology for farming, 59th round (January-December 2003). Report No.499 (59/33/2). New Delhi: Ministry of Statistics and Programme Implementation.

Pandey, M.M. (2006), Present Status and Future Requirement of Farm Equipment for Crop Production, Status of Farm Mechanization in India, Ministry of Agriculture, GOI, Delhi. Taken from http://agricoop.nic.in/farm%20Mech%20pdf/05024-05.pdf,69-103.

Patton,A.J. 2006, Modelling Asymmetric Exchange Rate Dependence, International Economic Review, Vol. 47, No.2, May, 2006.

Ramarao D, Agrawal Rashmi, Nanda S.K., Awasthi I.C., Joshi G.P., Bhattacharya Sanchita, Indra Kumar (2011). "Human Capital Requirements in Agriculture and Allied Sectors, NAIP Project Report, National Academy of Agricultural Research Management, Hyderabad, India published by Institute of Applied Manpower Research, New Delhi.

Rao BVLN, Chapter : Indian Agriculture Scenario in 'Towards Skill Endowed Human Resources in Agriculture' (2014) edited by D. Rama Roy, BNLN Roy, Rashmi Agrawal.

Subburaj V.K., 2013. Impact of Krishi Vigyan Kendra's on the Beneficiaries in Tamil Nadu and Puducherry, Ph.d. thesis, Gandhigram Rural Institute, Gandhigram (Tamil Nadu).

Sulaiman, R., and A. Hall. 2002. Beyond technology dissemination: Can Indian agricultural extension re-invent itself? ICAR Policy Brief 16. New Delhi: Indian Council of Agricultural Research

Sulaiman, R., and G. Holt. 2002. Extension, poverty and vulnerability in India: Country study for the Neuchatel Initiative. Working Paper 154. London: Overseas Development Institute.

Sulaiman, R., and A.W. van den Ban. 2003. Funding and delivering agricultural extension in India. Journal of international Agricultural and Extension Education 10(1): 21-30.

Sulaiman, R. 2003a. Agriculture extension: Involvement of private sector. Occasional Paper 29. Mumbai: Department of Economic Analysis and Research.

Sulaiman, R. 2003b. Innovations in agricultural extension in India. Rome: Food and Agriculture Organization of the United Nations, Sustainable Development Department.

Sulaiman, R. and A. Hall 2008. The fallacy of universal solutions in extension: Is ATMA the new T&V? www.innovationstudies.org/index.php?option=com_myblog&show=The-Fallacy-of-Universal-Solutions-in-Extension-139.html&Itemid>. Accessed October 4, 2010.

Thapa, G. and R. Gaiha (2011), "Smallholder Farming in Asia and the Pacific: Challenges and Opportunities", Paper presented at the Conference on New Directions for Small Holder Agriculture, January 24-25, Rome: IFAD.

Venkatesh P and Nithyashree M.L. (2014). Institutional Changes in Delivery of Agricultural Inputs and Services to Farm Households in India, Agricultural Economics Research Review, Vol.27, Issue: Conference.

White Howard, 2009. International Initiative For Impact Evaluation, Theory-Based Impact Evaluation: Principles and Practice, 3ie Working Paper 3, New Delhi.

Annex 1

Data Tables (KVK Interaction)

Sampled District wise Staff position in KVKs

State	District of KVK	Staff type	Sanctioned	In position			% of vacancies
				M	F	T	
Arunachal Pradesh	Tawang	Scientists[@]	7	4	1	5	28.6
		Technical support	2	1	1	2	0
		Contractual	-	-	-	-	-
		Others	9	-	-	-	-
		All	18	5	2	7	
	Papumpare	Scientists[@]	7	5	2	7	0
		Technical support	3	3	0	3	0
		Contractual	-	-	-	-	-
		Others	4	-	-	-	-
		All	14	8	2	10	
	West Kameng	Scientists[@]	7	5	2	7	0
		Technical support	5	2	3	5	0
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	12	7	5	12	
	Lohit	Scientists[@]	7	5	1	6	17
		Technical support	3	3	-	3	0
		Contractual	2	2	0	2	0
		Others	3	-	-	-	-
		All	15	10	1	11	
	Upper Subansiri	Scientists[@]	5	2	3	5	0
		Technical support	6	4	2	6	0
		Contractual	3	3	0	3	0
		Others	-	-	-	-	-
		All	14	9	5	14	
	East Siang	Scientists[@]	7	5	2	7	0
		Technical support	2	1	1	2	0
		Contractual	-	-	-	-	-
		Others	2	-	-	-	-
		All	11	6	3	9	
	Total	Scientists[@]	40	26	11	37	7.5
		Technical support	21	14	7	21	0
		Contractual	5	5	0	5	0
		Others	18	-	-	-	-
		All	84	45	18	63	
Madhya Pradesh	Umaria	Scientists[@]	7	4	0	4	43
		Technical support	3	1	0	1	67
		Contractual	-	-	-	-	0
		Others	6	-	-	-	-
		All	16	5	0	5	
	Satna	Scientists[@]	5	5	0	5	0
		Technical support	2	8	0	8	-
		Contractual	-	-	-	-	-
		Others	3	-	-	-	-
		All	10	13	-	13	
	Katni	Scientists[@]	7	7	0	7	0

		Technical support	3	2	0	2	33
		Contractual	-	-	-	-	-
		Others	2	-	-	-	-
		All	12	9	0	9	
	Shivpuri	Scientists[@]	5	4	0	4	20
		Technical support	5	-	-	-	100
		Contractual	-	-	-	-	-
		Others	4	-	-	-	-
		All	14	4	0	4	
	Jabalpur	Scientists[@]	7	6	1	7	0
		Technical support	3	1	2	3	0
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	7	3	10	
	Hoshangabad	Scientists[@]	7	2	3	5	29
		Technical support	3	3	1	4	-
		Contractual	-	-	-	-	-
		Others	4	-	-	-	-
		All	14	5	4	9	-
	Gwalior	Scientists[@]	7	4	3	7	0
		Technical support	6	5	1	6	0
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	13	9	4	13	-
	Chhindwara	Scientists[@]	7	3	0	3	57
		Technical support	3	2	-	2	33
		Contractual	-	-	-	-	-
		Others	5	-	-	-	-
		All	15	5	0	5	
	Bhopal	Scientists[@]	4	2	1	3	25
		Technical support	9	9	-	9	0
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	13	11	1	12	
	Ratlam	Scientists[@]	7	5	0	5	29
		Technical support	3	2	1	3	0
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	7	1	8	
	Total	Scientists[@]	63	42	8	50	20.6
		Technical support	40	33	5	38	5
		Contractual	-	-	-	-	-
		Others	36	-	-	-	-
		All	139	75	13	88	
Rajasthan	Jaipur	Scientists[@]	7	6	1	7	0
		Technical support	9	8	0	8	33
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	16	14	1	15	
	Kota	Scientists[@]	7	6	1	7	0
		Technical support	9	5	2	7	22
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-

		All	16	11	3	14	
	Banswara	Scientists[@]	4	4	0	4	75
		Technical support	7	6	0	6	14
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	11	10	0	10	
	Pokharan (Jaisalmer)	Scientists[@]	5	1	0	1	80
		Technical support	3	1	0	1	67
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	14	2	0	2	
	Barmer	Scientists[@]	6	5	0	5	17
		Technical support	3	-	-	-	-
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	15	5	0	5	-
	Chittorgarh	Scientists[@]	7	5	0	5	29
		Technical support	9	5	2	7	11
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	16	12	2	14	
	Jodhpur	Scientists[@]	7	0	0	0	100
		Technical support	6	1	0	1	83
		Contractual	2	-	-	-	100
		Others	-	-	-	-	-
		All	15	1	0	1	
	Jaisalmer	Scientists[@]	7	1	0	1	86
		Technical support	3	1	0	1	67
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	2	0	2	
	Sriganganagar	Scientists[@]	7	3	1	4	43
		Technical support	6	-	-	-	100
		Contractual	-	-	-	-	-
		Others	3	-	-		-
		All	16	3	1	4	
	Udaipur	Scientists[@]	7	7	0	7	0
		Technical support	3	2	0	2	33.3
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	15	9	0	9	-
	Barmer	Scientists[@]	7	1	0	1	86
		Technical support	3	-	-	-	100
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	1	0	1	
	Bharatpur	Scientists[@]	16	13	2	15	6
		Technical support	-	-	-	-	-
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	16	13	2	15	
	Total	Scientists[@]	87	52	5	57	23
		Technical support	61	29	4	33	54

		Contractual	02	-	-	-	-
		Others	33	-	-	-	-
		All	183	81	9	80	
Maharashtra	Kolhapur	Scientists[@]	10	3	0	3	40
		Technical support	9	6	0	6	33
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	19	9	0	9	
	Dhule	Scientists[@]	7	5	1	6	14
		Technical support	-	-	-	-	-
		Contractual	9	7	2	9	0
		Others	-	-	-	-	-
		All	16	12	3	15	
	Akola	Scientists[@]	7	5	1	6	14
		Technical support	-	-	-	-	-
		Contractual	9	7	2	9	0
		Others	-	-	-	-	-
		All	16	12	3	15	
	Wardha	Scientists[@]	7	2	1	3	57
		Technical support	3	-	-	-	100
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	2	1	3	
	Ratnagiri	Scientists[@]	8	4	0	4	50
		Technical support	3	3	0	3	0
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	11	7	0	7	
	Parbhani	Scientists[@]	6	5	1	6	17
		Technical support	5	5	0	5	0
		Contractual	-	-	-	-	-
		Others	4	-	-	-	
		All	15	10	1	11	
	Ahmednagar	Scientists[@]	7	6	1	7	0
		Technical support	9	9	0	9	-
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	16	15	1	16	
	Aurangabad	Scientists[@]	7	5	1	6	14
		Technical support	3	2	0	2	33
		Contractual	-	-	-	-	-
		Others	5	-	-	-	-
		All	15	7	1	8	
	Pune	Scientists[@]	7	7	0	7	0
		Technical support	3	3	0	3	0
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	10	0	10	
	Nagpur	Scientists[@]	7	4	1	5	29
		Technical support	3	2	1	3	0
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	6	2	8	

	Total	Scientists[@]	73	46	7	53	27.4
		Technical support	38	30	1	31	18.4
		Contractual	18	14	4	18	0
		Others	27	-	-	-	-
		All	156	90	12	102	
Tamil Nadu	Perambalur	Scientists[@]	6	2	3	5	17
		Technical support	3	2	1	3	0
		Contractual	1	0	1	1	0
		Others	5	-	-	-	-
		All	15	4	5	9	
	Dindigul	Scientists[@]	6	2	2	4	17
		Technical support	-	-	-	-	-
		Contractual	-	-	-	-	-
		Others	7	-	-	-	-
		All	13	2	2	4	
	Tuticorin	Scientists[@]	7	5	1	6	14
		Technical support	3	3	0	3	0
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	10	8	1	9	
	Madurai	Scientists[@]	7	4	3	7	0
		Technical support	3	-	-	-	67
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	10	4	3	7	
	Kanyakumari	Scientists[@]	7	5	2	7	0
		Technical support	3	1	2	3	-
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	16	6	4	10	
	Nilgiris	Scientists[@]	7	2	2	4	43
		Technical support	5	0	1	1	80
		Contractual	-	-	-	-	-
		Others	4	-	-	-	-
		All	16	2	3	5	
	Salem	Scientists[@]	7	3	4	7	0
		Technical support	-	2	1	3	-
		Contractual	-	-	-	-	-
		Others	6	5	1	6	-
		All	13	10	6	16	
	Erode	Scientists[@]	7	6	1	7	0
		Technical support	2	2	0	2	0
		Contractual	-	-	-	-	-
		Others	-	-	-	-	-
		All	9	8	1	9	
	Kanchipuram	Scientists[@]	7	3	3	6	14
		Technical support	9	9	0	9	-
		Contractual	-	-	-	-	-
		Others	6	-	-	-	-
		All	21	12	3	15	
	Coimbatore	Scientists[@]	7	5	2	7	0
		Technical support	3	2	1	3	-
		Contractual	-	-	-	-	-

		Others	6	-	-	-	-
		All	16	7	3	10	
	Total	Scientists[@]	67	37	23	60	10.4
		Technical support	31	21	6	27	13
		Contractual	01	-	-	-	-
		Others	40	5	1	6	-
		All	139	63	30	93	
All States		Scientists[@]	330	203	54	257	22.1
		Technical support	191	127	23	150	21.5
		Contractual	26	19	4	23	11.5
		Others	154	5	1	6	data N.A.
		All	701	354	82	436	

@ Scientists include PC and SMSs

Table 2: Type of infrastructure availability by states and type of governance of KVKs

Arunachal Pradesh

Infrastructures	ICAR				Government				SAU				NGO			
	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported
Admin Block	-	1	-	0	3	1	-	0	-	1	-	0	-	-	-	-
Hostel	1	-	-	0	-	-	3	1	-	-	1	0	-	-	-	-
Staff quarters	-	1	-	0	-	-	2	2	-	-	1	0	-	-	-	-
Demonstration units	-	1	-	0	2	1	1	0	-	1	-	0	-	-	-	-
Furniture	-	-	1	0	1	1	1	1	-	1	-	0	-	-	-	-
Office equipment	1	-	-	0	2	2	-	0	-	1	-	0	-	-	-	-
Electricity	-	1	-	0	3	-	-	1	1	-	-	0	-	-	-	-

Madhya Pradesh

Infrastructures	ICAR				Government				SAU				NGO			
	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported
Admin Block	1	-	-	0	-	-	-	-	5	1	1	0	1	1	-	0
Hostel	1	-	-	0	-	-	-	-	4	1	2	0	2	-	-	0
Staff quarters	1	-	-	0	-	-	-	-	4	1	2	0	2	-	-	0
Demonstration units	1	-	-	0	-	-	-	-	4	1	2	0	-	1	1	0
Furniture	-	1	-	0	-	-	-	-	3	1	3	0	-	1	-	1
Office equipment	-	1	-	0	-	-	-	-	4	1	2	0	1	1	-	0
Electricity	1	-	-	0	-	-	-	-	3	4	-	0	1	1	-	0

Rajasthan

Infrastructures	ICAR				Government				SAU				NGO			
	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported
Admin Block	-	-	-	-	-	-	-	-	6	1	2	1	2	-	-	0
Hostel	-	-	-	-	-	-	-	-	5	-	5	0	2	-	-	0
Staff quarters	-	-	-	-	-	-	-	-	3	3	4	0	2	-	-	0

Demonstration units	-	-	-	-	-	-	-	-	5	-	3	2	2	-	-	0
Furniture	-	-	-	-	-	-	-	-	4	1	2	3	1	1	-	0
Office equipment	-	-	-	-	-	-	-	-	7	2	1	0	1	1	-	0
Electricity	-	-	-	-	-	-	-	-	7	3	-	0	1	1	-	0

Maharashtra

Infrastructures	ICAR				Government				SAU				NGO			
	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported
Admin Block	1	-	-	0	-	-	-	-	2	1	-	0	5	-	1	0
Hostel	-	1	-	0	-	-	-	-	1	-	2	0	5	-	1	0
Staff quarters	-	-	-	1	-	-	-	-	1	-	2	0	4	-	2	0
Demonstration units	-	-	-	1	-	-	-	-	1	2	-	0	4	1	-	1
Furniture	-	-	-	1	-	-	-	-	1	2	-	0	5	-	1	0
Office equipment	-	1	-	0	-	-	-	-	2	1	-	0	6	-	-	0
Electricity	-	-	-	1	-	-	-	-	3	-	-	0	6	-	-	0

Tamil Nadu

Infrastructures	ICAR				Government				SAU				NGO			
	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported	Fully	Partly	N.A	Data not reported
Admin Block	1	-	-	0	-	-	-	1	3	-	-	0	4	1	-	0
Hostel	-	-	1	0	-	-	-	1	2	-	-	1	3	2	-	0
Staff quarters	-	-	1	0	-	-	-	1	2	-	-	1	3	1	1	0
Demonstration units	-	1	-	0	-	-	-	1	2	1	-	0	2	3	-	0
Furniture	-	1	-	0	1	-	-	0	3	-	-	0	3	2	-	0
Office equipment	-	-	1	0	1	-	-	0	2	-	-	1	3	1	1	0
Electricity	1	-	-	0	1	-	-	0	2	-	-	1	3	1	-	1

Table 3: Impact on those adopting the technology by states and type of Governance

Type of Impact	No. of technologies reported by KVKs of				
	ICAR	GOVT	SAU	NGO	All
Reduction in cost	13	1	82	40	136
Improved productivity/yield	27	5	98	85	215
Time saving	11	4	64	7	86
Multiple cropping	0	3	79	6	88
Less labor intensive operations	12	4	59	8	83
Confidence of farmers developed	3	5	82	11	101
Quality of product improved	5	1	88	55	149
Enhanced income	11	5	91	30	137
Less drudgery	0	3	58	5	66
Reduction in wastage	0	2	58	12	72
Enhanced marketability	2	1	81	12	96
Impact on those adopting the technology, Arunachal Pradesh					
Type of Impact	No. of technologies reported by KVKs of				
	ICAR	GOVT	SAU	NGO	All
Reduction in cost	1	1	64	-	66
Improved productivity/yield	1	5	64	-	70
Time saving	0	4	44	-	48
Multiple cropping	0	3	64	-	67
Less labor intensive operations	0	4	44	-	48
Confidence of farmers developed	1	5	64	-	70
Quality of product improved	1	1	64	-	66
Enhanced income	1	5	64	-	70
Less drudgery	0	3	44	-	47
Reduction in wastage	0	2	44	-	46
Enhanced marketability	1	1	64	-	66
Impact on those adopting the technology, Madhya Pradesh					
Type of Impact	No. of technologies reported by KVKs of				
	ICAR	GOVT	SAU	NGO	All
Reduction in cost	9	-	7	28	44
Improved productivity/yield	15	-	19	52	86
Time saving	9	-	7	1	17
Multiple cropping	0	-	7	1	8
Less labor intensive operations	9	-	6	1	16
Confidence of farmers developed	0	-	7	1	8
Quality of product improved	0	-	15	37	52
Enhanced income	7	-	16	8	31
Less drudgery	0	-	6	1	7
Reduction in wastage	0	-	6	1	7
Enhanced marketability	0	-	7	1	8
Impact on those adopting the technology, Rajasthan					
Type of Impact	**No. of technologies reported by KVKs of**				
	ICAR	GOVT	SAU	NGO	All
Reduction in cost	-	-	5	7	12
Improved productivity/yield	-	-	8	13	21
Time saving	-	-	6	2	8
Multiple cropping	-	-	5	1	6
Less labor intensive operations	-	-	5	3	8
Confidence of farmers developed	-	-	5	5	10
Quality of product improved	-	-	6	4	10

Enhanced income	-	-	5	12	17
Less drudgery	-	-	5	0	5
Reduction in wastage	-	-	5	1	6
Enhanced marketability	-	-	4	3	7
Impact on those adopting the technology, Maharashtra					
Type of Impact	No. of technologies reported by KVKs of				
	ICAR	GOVT	SAU	NGO	All
Reduction in cost	3	-	2	2	7
Improved productivity/yield	11	-	3	7	21
Time saving	2	-	2	2	6
Multiple cropping	0	-	2	2	4
Less labor intensive operations	3	-	2	2	7
Confidence of farmers developed	2	-	2	2	6
Quality of product improved	4	-	2	5	11
Enhanced income	3	-	2	3	8
Less drudgery	0	-	2	2	4
Reduction in wastage	0	-	2	2	4
Enhanced marketability	1	-	2	3	6
Impact on those adopting the technology, Tamil Nadu					
Type of Impact	No. of technologies reported by KVKs of				
	ICAR	GOVT	SAU	NGO	All
Reduction in cost	0	0	4	3	7
Improved productivity/yield	0	0	4	13	17
Time saving	0	0	5	2	7
Multiple cropping	0	0	1	2	3
Less labor intensive operations	0	0	2	2	4
Confidence of farmers developed	0	0	4	3	7
Quality of product improved	0	0	1	9	10
Enhanced income	0	0	4	7	11
Less drudgery	0	0	1	2	3
Reduction in wastage	0	0	1	8	9
Enhanced marketability	0	0	4	5	9

Table 4: Entrepreneurship development programmes of KVKs by states and type of governance

Type of KVK	No. of participants			No. who started business		
	Male	Female	Total	Male	Female	Total
ICAR	1880	232	2112	757	14	771
GOVT	621	704	1325	249	65	314
SAU	7850	4333	12183	1519	762	2281
NGO	7544	2764	10308	2011	974	2985
ALL	17895	8033	25928	4536	1815	6351

Arunachal Pradesh

Type of KVK	No. of participants			No. who started business		
	Male	Female	Total	Male	Female	Total
ICAR	53	87	140	37	14	51
GOVT	191	275	466	43	11	54
SAU	180	238	418	33	34	67
NGO	-	-	-	-	-	-
ALL	424	600	1024	113	59	172

Madhya Pradesh

Type of KVK	No. of participants			No. who started business		
	Male	Female	Total	Male	Female	Total
ICAR	1754	-	1754	713	-	713
GOVT	-	-	-	-	-	-
SAU	2198	1574	3772	519	369	888
NGO	60	-	60	18	-	18
ALL	4012	1574	5586	1250	369	1619

Rajasthan

Type of KVK	No. of participants			No. who started business		
	Male	Female	Total	Male	Female	Total
ICAR	-	-	-	-	-	-
GOVT	-	-	-	-	-	-
SAU	1711	1729	3440	765	204	969
NGO	621	329	950	363	211	574
ALL	2332	2058	4390	1128	415	1543

Maharashtra

Type of KVK	No. of participants			No. who started business		
	Male	Female	Total	Male	Female	Total
ICAR	73	145	218	7	-	7
GOVT	-	-	-	-	-	-
SAU	795	673	1468	175	124	299
NGO	4396	750	5146	335	96	431
ALL	5264	1568	6832	517	220	737

Tamil Nadu

Type of KVK	No. of participants			No. who started business		
	Male	Female	Total	Male	Female	Total
ICAR	-	-	-	-	-	-
GOVT	430	429	859	206	54	260
SAU	2966	119	3085	27	31	58
NGO	2467	1685	4152	1295	667	1962
ALL	5863	2233	8096	1528	752	2280

Annex 2

Data Tables (Farmers' survey)

Table 1: State-wise Distribution of farmers by gender and educational background

States	Education	Males	Females	Total	% Males	% females
Madhya Pradesh	Primary and below	257	28	285	90.18	9.82
	High School	145	16	161	90.06	9.94
	Graduate and above	70	7	77	90.91	9.09
	Technical Education in Agri.	8	0	8	100.00	0.00
	Technical Education Other field	7	0	7	57.14	42.86
	Total	**487**	**51**	**538**	**89.96**	**10.04**
Maharashtra	Primary and below	104	18	122	85.25	14.75
	High School	176	15	191	92.15	7.85
	Graduate and above	69	6	75	90.67	9.33
	Technical education in Agri	6	0	6	100.00	0.00
	Technical Education other field	3	0	3	100.00	0.00
	No Response	6	0	6	50.00	50.00
	Total	**364**	**39**	**403**	**89.33**	**10.67**
Rajasthan	Primary and below	195	31	226	86.28	13.72
	High School	117	10	127	92.13	7.87
	Graduate and above	48	4	52	92.31	7.69
	Technical Education in Agri	3	0	3	100.00	0.00
	Technical Education other field	4	0	4	100.00	0.00
	Total	**367**	**45**	**412**	**88.83**	**11.17**
Tamil Nadu	Primary and below	185	32	217	85.25	14.75
	High School	166	26	192	86.46	13.54
	Graduate and above	59	8	67	88.06	11.94
	Technical Education in Agri	6	0	6	100.00	0.00
	Technical Education other field	10	0	10	100.00	0.00
	Total	**426**	**66**	**492**	**86.18**	**13.82**
Arunachal Pradesh	Primary and below	10	10	20	50.00	50.00
	High School	1	3	4	25.00	75.00
	Graduate and above	0	1	1	0.00	100.00
	Technical Education in Agri	0	0	0	0.00	0.00
	Technical Education other field	0	0	0	0.00	0.00
	Total	**11**	**14**	**25**	**44.00**	**56.00**
Grand Total	Primary and below	751	119	870	86.32	13.68
	High School	605	70	675	89.63	10.37
	Graduate and above	246	26	272	90.07	9.93
	Technical Education in Agri	23	0	23	100.00	0.00

	Technical Education other field	24	0	24	100.00	0.00
	No Response	6	0	6	100.00	0.00
	Total All States	**1655**	**215**	**1870**	**87.97**	**12.03**

Table 2:. Sate-wise number of farmers covered by gender and age-group

States	Age Group	Number of Farmers			% share of		Coloumn percentages		
		Males	Females	Total	Males	Females	Males	Females	Total
Arunachal Pradesh	15 – 24	0	0	0	0	0	0.00	0.00	0.00
	25 – 34	4	3	7	57.14	42.86	36.36	21.43	28.00
	35- 44	3	9	12	25	75	27.28	64.29	48.00
	45 – 54	4	2	6	66.67	33.33	36.36	14.28	24.00
	55 +	0	0	0	0	0	0.00	0.00	0.00
	All ages	***11***	***14***	***25***	***44***	***56***	100.00	100.00	100.00
Madhya Pradesh	15 – 24	32	6	38	84.21	15.79	6.57	11.76	7.06
	25 – 34	102	16	118	86.44	13.56	20.94	31.37	21.93
	35- 44	157	15	172	91.28	8.72	32.24	29.42	31.97
	45 – 54	108	9	117	92.31	7.69	22.18	17.65	21.75
	55 +	88	5	93	94.62	5.38	18.07	9.80	17.29
	All ages	***487***	***51***	***538***	***90.52***	***9.48***	100.00	100.00	100.00
Maharashtra	15 - 24	11	0	11	100	0	3.02	0.00	2.73
	25 - 34	68	7	75	90.67	9.33	18.68	17.95	18.61
	35- 44	132	19	151	87.42	12.58	36.26	48.72	37.47
	45 - 54	75	9	84	89.29	10.71	20.60	23.08	20.84
	55 +	72	4	76	94.74	5.26	19.78	10.26	18.86
	NR	***6***	***0***	***6***	100	0	1.65	0.00	1.49
	All ages	***364***	***39***	***403***	***90.32***	***9.68***	100.00	100.00	100.00
Rajasthan	15 - 24	27	12	39	69.23	30.77	7.36	26.67	9.47
	25 - 34	74	10	84	88.1	11.9	20.16	22.22	20.39
	35- 44	92	10	102	90.2	9.8	25.07	22.22	24.76
	45 - 54	76	8	84	90.48	9.52	20.71	17.78	20.39
	55 +	98	5	103	95.15	4.85	26.70	11.11	25.00
	All ages	***367***	***45***	***412***	***89.08***	***10.92***	100.00	100.00	100.00
Tamil Nadu	15 - 24	2	1	3	66.67	33.33	0.47	1.52	0.61
	25 - 34	33	6	39	84.62	15.38	7.75	9.09	7.93
	35- 44	127	24	151	84.11	15.89	29.81	36.36	30.69
	45 - 54	135	19	154	87.66	12.34	31.69	28.79	31.30
	55 +	122	15	137	89.05	10.95	28.64	22.73	27.85
	NR	***7***	*1*	*8*	87.5	12.5	1.64	1.52	1.63
	All ages	***426***	***66***	***492***	***86.59***	***13.41***	100.00	100.00	100.00
Grand Total	15 - 24	72	19	91	79.12	20.88	4.35	8.84	4.87

for all States	25 - 34	281	42	323	87	13	16.98	19.53	17.27
	35- 44	511	77	588	86.9	13.1	30.88	35.81	31.44
	45 - 54	398	47	445	89.44	10.56	24.05	21.86	23.80
	55 +	380	29	409	92.91	7.09	22.96	13.49	21.87
	NR	13	1	14	92.86	7.14	0.79	0.47	0.75
	All ages	***1655***	***215***	***1870***	***88.5***	***11.5***	100.00	100.00	100.00

Table 3: State wise Distribution of Farmers by size of Holdings

State	Size of holding (in ha)	No. of farmers covered	Percentages	Agri Census 2010-11
Madhya Pradesh	1 to 3	384	71.38	43.86
	4 to 5	88	16.36	27.60
	5 to 8	44	8.18	18.65
	9 to10	5	0.93	8.89
	More than 10	12	2.23	1.00
	No Response	5	0.93	
	All	**538**	**100.0**	
Maharashtra	1 to 3	260	64.52	48.97
	4 to 5	83	20.60	29.58
	5 to 8	30	7.44	15.76
	9 to10	7	1.74	5.19
	more than 10	3	0.74	0.50
	No Response	20	4.96	
	All sizes	**403**	**100.00**	
Rajasthan	1 to 3	190	46.12	36.46
	4 to 5	77	18.69	21.94
	5 to 8	65	15.78	19.38
	9 to10	15	3.64	16.36
	More than 10	38	9.22	5.86
	No Response	27	6.55	
	All sizes	**412**	**100.0**	
Tamil Nadu	1 to 3	258	52.44	77.19
	4 to 5	84	17.07	14.55
	5 to 8	37	7.52	6.19
	9 to10	23	4.67	1.86
	More than 10	53	10.77	0.21
	No Response	37	7.52	
	All sizes	**492**	**100.00**	
Arunachal Pradesh	1 to 3	7	28.00	67.31
	4 to 5	5	20.00	18.25
	5 to 8	8	32.00	11.16
	9 to10	1	4.00	3.12
	More than 10	3	12.00	0.15
	No Response	1	4.00	
	All sizes	**25**	**100.00**	
	1 to 3	1099	58.77	67.10

Grand total	4 to 5	0337	18.02	17.91
	5 to 8	0184	09.84	10.04
	9 to10	0051	02.73	4.25
	more than 10	0109	05.83	0.70
	NR	0090	04.81	
	All sizes	**1870**	**100.00**	

Table 4: State wise No. of farmers by size of holding and irrigation status

State	Size of holding (in ha)	No. of farmers covered	Total irrigated	Total unirrigated	Total land	% of irrigated land	% share of Irrigated Land in total land	Agri Census 2010-11 Data on % net irrigated area
Madhya Pradesh	1 to 3	384	739	164	903	45.65	81.89	
	4 to 5	88	318	60	378	19.63	84.14	
	5 to 8	44	242	20	262	14.97	92.38	
	9 to10	5	47	2	49	2.90	95.92	
	10 +	12	256	52	308	15.81	83.12	
	NR	5	0	0	0	1.05	0.00	
	All	**538**	**1602**	**297**	**1900**	**100.00**	**84.34**	**43.7**
Rajasthan	1 to 3	190	396	99	495	14.74	80.01	
	4 to 5	77	638	86	724	23.73	88.12	
	5 to 8	65	681	176	857	25.33	79.49	
	9 to10	15	172	57	229	6.42	75.16	
	10 +	38	694	455	1149	25.80	60.38	
	NR	27	107	5	112	3.98	95.54	
	All sizes	**412**	**2689**	**878**	**3567**	**100.00**	**75.38**	**37.7**
Tamil Nadu	1 to 3	258	365	313	678	20.03	53.9	
	4 to 5	84	228	146	373	12.47	61.0	
	5 to 8	37	218	60	278	11.97	78.5	
	9 to10	23	172	60	232	9.42	74.1	
	10 +	53	817	138	955	44.77	85.5	
	NR	37	25	14	39	1.35	63.5	
	All sizes	**492**	**1825**	**731**	**2556**	**100.01**	**71.4**	**56.6**
Arunachal Pradesh	1 to 3	7	2	7	8	100.00	18.7	
	4 to 5	5	0	15	15	0.00	0.0	
	5 to 8	8	0	40	40	0.00	0.0	
	9 to10	1	0	9	9	0.00	0.0	
	more than 10	3	0	10	10	0.00	0.0	
	NR	1	0		0	0.00	0.0	
	All sizes	**25**	**2**	**81**	**82**	**100.00**	**1.8**	**25.7**
r a s	1 to 3	260	487	119	606	42.49	80.4	

	4 to 5	83	397	75	472	34.67	84.2	
	5 to 8	30	145	140	285	12.61	50.8	
	9 to10	7	54	10	64	4.71	84.4	
	more than 10	3	21		21	1.79	100.0	
	NR	20	43	15	58	3.75	74.8	
	All sizes	**403**	**1146**	**358**	**1504**	**100.02**	**76.2**	**18.2**
Grand Total	1 to 3	1099	1989	701	2690	27.39	73.9	
	4 to 5	337	1581	381	1962	21.76	80.6	
	5 to 8	184	1287	436	1722	17.71	74.7	
	9 to10	51	445	138	583	6.13	76.3	
	more than 10	109	1787	655	2443	24.61	73.2	
	NR	90	175	34	209	2.41	83.8	
	All sizes	**1870**	**7264**	**2345**	**9609**	**100.00**	**75.6**	**44.2**

Table 5: State wise No. of farmers by size of holding and ownership of farm equipment

States	Size of holding (in ha)	No. of farmers having at least one machinery	No machinery	Total Farmers	% of farmers having machinery	% of farmers don't' have machinery	Row percentages	
							farmers with machinery	No machinery
Madhya Pradesh	1 to 3	243	141	384	65.32	84.94	63.28	36.72
	4 to 5	75	13	88	20.16	7.83	85.23	14.77
	5 to 8	37	7	44	9.95	4.22	84.09	15.91
	9 to10	2	3	5	0.54	1.81	40.00	60.00
	> 10	10	2	12	2.69	1.20	83.33	16.67
	NR	5	0	5	1.34	0.00	100.00	0.00
	All	372	166	538	100.00	100.00	69.14	30.86
Rajasthan	1 to 3	85	105	190	31.72	72.92	44.74	55.26
	4 to 5	61	16	77	22.76	11.11	79.22	20.78
	5 to 8	54	11	65	20.15	7.64	83.08	16.92
	9 to10	12	3	15	4.48	2.08	80.00	20.00
	> 10	32	6	38	11.94	4.17	84.21	15.79
	NR	24	3	27	8.96	2.08	88.89	11.11
	All sizes	268	144	412	100.00	100.00	65.05	34.95
Tamil Nadu	1 to 3	58	200	258	23.29	82.30	22.48	77.52
	4 to 5	74	10	84	29.72	4.12	88.10	11.90
	5 to 8	17	20	37	6.83	8.23	45.95	54.05
	9 to10	15	8	23	6.02	3.29	65.22	34.78
	> 10	52	1	53	20.88	0.41	98.11	1.89
	NR	33	4	37	13.25	1.65	89.19	10.81
	All sizes	249	243	492	100.00	100.00	50.61	49.39
Arunachal Pradesh	1 to 3	1	6	7	25.00	28.57	14.29	85.71
	4 to 5	0	5	5	0.00	23.81	0.00	100.00
	5 to 8	1	7	8	25.00	33.33	12.50	87.50
	9 to10	0	1	1	0.00	4.76	0.00	100.00
	> 10	2	1	3	50.00	4.76	66.67	33.33
	NR	0	1	1	0.00	4.76	0.00	100.00
	All sizes	4	21	25	100.00	100.00	16.00	84.00
Maharashtra	1 to 3	115	145	260	57.50	71.43	44.23	55.77
	4 to 5	42	41	83	21.00	20.20	50.60	49.40
	5 to 8	17	13	30	8.50	6.40	56.67	43.33
	9 to10	6	1	7	3.00	0.49	85.71	14.29
	> 10	3	0	3	1.50	0.00	100.00	0.00
	NR	17	3	20	8.50	1.48	85.00	15.00

	All sizes	200	203	403	100.00	100.00	49.63	50.37
Grand total	1 to 3	502	597	1099	45.93	76.83	45.68	54.32
	4 to 5	252	85	337	23.06	10.94	74.78	25.22
	5 to 8	126	58	184	11.53	7.46	68.48	31.52
	9 to10	35	16	51	3.20	2.06	68.63	31.37
	more than 10	99	10	109	9.06	1.29	90.83	9.17
	NR	79	11	90	7.23	1.42	87.78	12.22
	All sizes	1093	777	1870	100.00	100.00	58.45	41.55

Table 6: State wise distribution of Adoption of new technologies and time gap by size of holding

States	Size of holding (ha)	Status of Adopted by time gap						
		Immed-iately	Next season	After seeing impact	After one year	After Long time	Still Not	Total
Madhya Pradesh	1 to 3	182	66	17	16	4	99	384
	4 to 5	44	20	10	5	2	7	88
	5 to 8	26	7	3	3	0	5	44
	9 to10	2	0	1	1	0	1	5
	More than 10	4	1	1	1	0	5	12
	NR	4	1	0	0	0	0	5
	All	**262**	**95**	**32**	**26**	**6**	**117**	**538**
Rajasthan	1 to 3	54	48	21	13	11	43	190
	4 to 5	39	20	4	6	2	6	77
	5 to 8	31	14	3	3	1	13	65
	9 to10	4	5		1	1	4	15
	More than 10	10	16	1	2	1	8	38
	NR	0	4	3	1	0	19	27
	All	**138**	**107**	**32**	**26**	**16**	**93**	**412**
Tamil Nadu	1 to 3	125	41	64	13	8	7	258
	4 to 5	29	11	18	1	1	24	84
	5 to 8	12	5	6	1	0	13	37
	9 to10	10	5	7	0	0	1	23
	More than 10	22	7	8	0	0	16	53
	NR	5	12	6	1	0	13	37
	All	**203**	**81**	**109**	**16**	**9**	**74**	**492**
Arunachal Pradesh	1 to 3	4	1	2	0	0	0	7
	4 to 5	4	1	0	0	0	0	5
	5 to 8	6	1	1	0	0	0	8
	9 to10	0	1	0	0	0	0	1
	More than 10	1	0	1	1	0	0	3
	NR	0	0	0	0	0	1	1
	All	**15**	**4**	**4**	**1**	**0**	**1**	**25**
Maharashtra	1 to 3	83	93	54	16	2	12	260
	4 to 5	32	29	11	3	0	8	83
	5 to 8	8	14	3	1	1	3	30
	9 to10	1	2	0	0	0	4	7
	More than 10	1	1	0	0	0	1	3
	NR	4	6	1	1	0	8	20
	All	**129**	**145**	**69**	**21**	**3**	**36**	**403**

Total	1 to 3	448	249	158	58	25	161	1099
	4 to 5	148	81	43	15	5	45	337
	5 to 8	83	41	16	8	2	34	184
	9 to10	17	13	8	2	1	10	51
	More than 10	38	25	11	4	1	30	109
	NR	13	23	10	3	0	41	90
	All	**747**	**432**	**246**	**90**	**34**	**321**	**1870**

Annex 3

State-wise and discipline wise Technologies Adoption

Madhya Pradesh

S.No.	Field in which technology was adopted	Name of the Technology Adopted
1.	Agriculture	SRI system of paddy IWM in Paddy INM in wheat Seed Production Soybean JS-9560 Agro-forestry system Gram JG-130 Growing of gram after paddy under rainfed situation Heat tolerant variety of gram JG 40 Introduction of medium duration pigeon pea variety ICPL 88039 with integrated pest management Introduction of with resistant gram variety JG 63 with IPM module Alternate cropping system (Trapa-Wheat) for water logged low lying areas Intercropping of grain crops under aonla and eucalyptus Introduction of short duration Pea variety PSM-3 High yielding scented variety PS-3 of Paddy High yielding Soybean Variety 9305 Short duration high yielding Pusa-33 variety of pigeonpea Short duration high yielding hybrid ICPH 2671 variety of pigeonpea Demonstration on high yielding multiple resistant variety JS-97-52 Short duration high yielding variety JS-95-60 of osybean Integrated pest management in soyabean Integrated pest management in Gram Integrated disease management in gram Integrated weed management in soybean Integrated weed management in Paddy Integrated weed management in wheat High yielding timely sown variety of MP-1201 of wheat High yielding variety of late sown variety of MP-1202 of wheat Wilt resistant high yielding variety of JG 130 of Gram HY late sown variety of JG 14 of Gram High yielding Sel-7 var of Tomato New HYV of wheat HI 15444 HYV variety JW 3211 of wheat HYV variety HI 8663 of wheat HYV variety JW 3269 of wheat Herbicidal weed control through Pendimethalin in mustard To demonstrate the performance of JS-95-60 variety of soyabean Insecticide Proferofos 50 EC in gram against pod borer STV based NPK in wheat Demonstration of chlorimuron+metsulfuron in paddy Demonstration of high yielding wheat variety GW 332 Demonstration of weed control through vishbyaribec sodium in paddy Demonstration of potassium with STV based nutrient management in paddy

		Quality seed production Hand operated grain cleaner Pedal operated grain cleaner Varietal Replacement Soybean Mustard Pusa agrani Wheat JW-1142,GW-322 HI-8494,GramJG-226 & 322,JG-16,PKV-4
2.	Horticulture	Tomato production technology IPM module for tomato Introduction of Kharif onion Integrated nutrient managaement in Tomato and brinjal Income generation of farm women's by growing of green vegetable of Green pea Income generation of farm women's by growing of garlic G-282 Variety Income Generation of farm women due to Oyster mushroom cultivation To demonstrate the performance of improved variety of tomato Demonstratiaon of high yielding variety of brinjal Demonstration of high yielding variety of Chilli Demonstration of boron application in potato Plastic mulching for vegetable cultivation Hi-Tech vegetables Meadow orchard of guava Potato slicer Vegetable Pea PSM-3 Onion AFLR
3.	Floriculture	Improved variety of marigold cultivation for income generation of farm womens Demonstration of high yielding marigold variety Pusa Narangi
4.	Animal Husbandry	Nutrient management through mineral mixture in buffaloes Demonstration of composite dewormer for control of eno& ecto parasite in the animals Azolla cultivation Napier grass cultivation Balance feeding (TMR Sami) Pregnant Animal management Backyard poultry (Dual purpose improved poultry bird) Clean Milking
5.	Soil and Nutrient management	Plantation of eucalyptus of degraded land Use of soil test based fertilizer dose of NPK Improved varity + STV based nutrient management Improved varity JG-11 + STV based nutrient management Improved variety TJM 3 seed balance + dose of fertilizer Improved variety JS 93-05seed balance + dose of fertilizer Improved seed variety Rohini+balance does of fertilizers LPM Balanced Ration with mineral & vitamin supplement Varmi Composting & Vermi Culture Nutritional Garden
6.	Post harvest management	Value addition of fruits & vegetables Enhancement of efficiency of farm women due to use of Maize Sheller for shelling of Maize Cobs Balanced Ration with mineral & vitamin supplement

7.	Mechanisation	Raise Bed Ridge & furrow system Zero Tillage Drip Irrigation system Agro-horti. Based system Drip fertigation Tractor operated rotavator Tractor operated Seed cum fertilizer drill Tractor operated roto till drill Tractor operated inclined plate planter Twin wheel hoe Hand grubber Seed treatment drum Tractor operated sprayer Straw reaper combine Serrated sickle Fertilizer broad caster Hand rigder Slow moving vehicle embleum Self propelled reaper Regular dewormer Spiral Seed Grader Efficiency of farm women due to use of seriated sickle in Paddy Ridge and furrow planting of YMV resistant variety (JS 9752) of soybean

Maharashtra

S.No.	Field in which technology was adopted	Name of the Technology Adopted
1.	**Agriculture**	Seed treatment of biofertiliser viz Azatobactor and PSB in wheat Use of improved variety JS-9305 Management of soybean leaf defoliators Use of improved variety AKM-4 for higher production Use of improved variety PKV Udid-15 for higher production Use of improved variety AKT 8811 for higher production IPM Pegeonpea Use of improved variety JAKI 9218 for higher production IPM chickpea Use of improved variety AKW 3722 Use of improved vriety AKW 4627 Seed treatment with Thiamethoxam 35 FS Ground nut Decorticator Cotton picking Apron Use of improved variety JS-9305 Management of soybean leaf defoliators Use of improved variety AKM-8802 for higher production ICM/IPM/IDM of soybean/cotton/pigeon pea/Chick Pea New improved variety of soybean/wheat/pigeon pea/chickpea/Sesamum/Fruit Crop/Spice crop Seed Treatment Dissemination of improved varieties in Rice Change in cropping pattern Rectangular spacing for optimum plant density of BT cotton Varietal evaluation of Soybean Varietal evaluation of Pigeon pea Varietal evaluation of Green gram

		Leaf reddening in Cotton Fertilizer management cotton Varietal evaluation of Bengal gram Assessment of rectangular spacing for optimum plant density of Pigeon pea variety BDN-708 Effect of wide row spacing and fertigation on production on productivity of Bt Cotton Varietal evaluation of Sorghum 2% salt solution treatment to soybean straw IPM & IDM in Cotton IPM & IDM in Soybean Dense planting in Bt cotton Use of magnesium sulphate in Bt cotton to minimize the leaf reddening Use of HYVs of bengal gram i.e. Digvijay Use of HYVs of rabi sorghum i.e. Chitra, revati IPM & IDM in Chickpea Sucking pests management in Bt cotton Application of Zn chelation with organic manure for wheat crop in calcareous soil Soil test based balance nutrients management for bybrid maize In situ trash composting in ratoon sugarcane Introduction of REdgramBDN711 IPM Redgram Introduction of new Rabi Jowar variety Phule vasudha Use of foliar spray in adsali sugarcane Assessment of variety RSV1006 in medium black soil of Pune Fertigation of 70% (RDF) N, P,K through Urea, MOP, DAP & H3PO4 Adasali plantedsugarcane in 13 equal split Assessment o High Density Planting System I Cotton Assessment of pigeon pea variety (BSMR-736) Assessment of Linseed variety PKV-NL 260 Assessment of Wheat variety AKAW-4627 Management in helicoverpa/chickpea in cotton Biological control of semilooper in soybean
2.	**Horticulture**	Management of Phyyopthora in citrus Alternatie portray techology for raising hybrid chilli seedlings Onion: Phule Samarth Chilli: Phule Jyoti Tomato: Phule Raja Onion N2-4-1 Pomegranate, Bhagwa, Bitter gourd: Phule Green Gold Use of silicon element for improving quality andyield in onion IPM in Mango & Cashew spraying schedule Application of GA for recurrent flowering in mango Construction of Kokan Vijay Bandhara Instruction of new variety of Drumstick KDM-1, Bhaggya Use of seedling tray and coco-peat for vegetable production IPM &IDM in Tomato, Use of INM in onion Leaf test baed nutrient management in capsicum Use of skirting bags in banana IDM and INM in pomegranate Use of weedicides in onion Use of growth regulator in mango Use of PPcoverbags in pomegranate Root knot nematode management in pomegranate Shoot and fruit borer management in brinjal Thrips and blight management in onion

		Integrated nutrients management for rabi onion Use of bio-organic slurry for pomegranate Backyard kitchen garden Weds management in Citrus Pre-harvest fruit drop in citrus High yielding variety Onion (Akola Safed) High yielding variey of Chilly (Tejas) Rejuvenation of old and less yielding trees of Nagpur Mandarin Use of polythene mulch in tomato to improve yield and quality Use of polythene mulch in muskmelon to improve quality and yield Varietal evaluation of Safflower
3.	**Animal Husbandry**	Control of Endo & Ectoparasites in goat Dissemination of poultry breed giriraja Varietal evaluation of Hybrid napier Fodder management by perennial napier grass i.e. Jaywant Marvel, Co4, DHN-6 Breed management in goat-Osmanabadi, Sirohi Calcium feeding in cross breed cows to minized calcium deficiency Rearing Grampriya, Vanraja and Swarnadhara poultry for egg production in back yard poultry Saaf kit for mastitismngt. in crossbred cow Wanjara for back yard poultry Use of area specific mineral mixtures in cross bred cows Feeding bypassfat to dairy cows BYP with improved breed of Chicken: Swarnadhara Supplementary concentrate feeding to Lctatin does Use of chelated mineral in cattle died Ecto& Endo parasitic controlling in goats Vitamin supplementation and deworming for avaoiding anoestrus in first calf heifer
4.	**Soil and Nutrient management**	Set treatment of biofertilizers Chelated mineral mixture
5.	**Post harvest management**	Store grain pest management Food processing and preservation
6.	**Mechanisation**	Drudgery reduction farm tools Farm Mechanization Water conservation Technology Effective use of long handle Khurpi Effective use of ergonomically design women friendly cotton picking apron for cotton picking Use of drudgery reducing implement MKV, Sickle Spirulina production and value addition for self consumption & employment generation

Rajasthan

S.No.	Field in which technology was adopted	Name of the Technology Adopted
1.	**Agriculture**	Use of high yielding varieties in cereals, pulse & oilseeds Proper seed rate and spacing in cereals and oilseeds Weed management in cereal, pulses and oilseeds Seed Treatment in Groundnut Cropping Systems Integrated Farming Seed production Integrated Crop Management

		Integrated Nutrient management in Cereals Planting material production Productivity enhancement in field crops Seed replacement Seed treatment practices Nursery management Improved cultivars of field crops Use of improved seed Farmers adopting line sowing system in kharif & rabi season Use of short duration & drought tolerant crops & crops varieties like moth, guar, moong, bajra Mustard-Varital improvement Rohini, NRCDR-2,NRCHB-101 Varietal improvement Raj 3765,4037 Wheat- Varietal improvement Raj 3765,4037 Use of thio uarea as seed soaking as well as spray of standing crop Barley-Varietal improvement RD 2552,2592,RD 2508 We of thio urea seed soaking and standing crop Gram-Varietal RSG,888,884,CSJD 884,RSG 896 IPM in Gram Lentil- Varietal improvement K-75 Foliar feeding of 0.1%thio urea flowering stage Cluster bean-Varietal improvement RGC 1003,1017,1018,986 Okra-Varietal hybrid, Akra, Anamica MIS 707 Plant protection measures i.e. two spray of Roger 1ml/lit water at 15 days interval Integrated nutrient management in cereals
2.	**Horticulture**	Vegetable cultivation under drip Line sowing in vegetable nursery Use of Plastic Mulch in vegetable cultivation Vegetable cultivation under tunnel Fruit Plant Cultivation under drip Use of PGR in vegetable cultivation Off-season vegetables Layout and Management of Orchards Cultivation of Fruit Ber orcharch Gola, Sen Pomegranate orchard, Ber budding Datepalm orchard, Medzul, Barhi, Khadravi Seed treatment in cumin with carbendaim Kitchen gardening, Horticulture Early vegetable Kinnow mandarin Orchard Watermelon Nutritional garden Adoption of date palm & pomegranate cultivation Adoption of vegetable cultivation Adoption of protected cultivation of cucumber, tomato Adoption of spray schedule in cumin Adoption of drip irrigation in orchards Tomato-varietal hybrid INDM 9502,9505 Brinjal-Varietal hybrid Neelam, Navkiran Cauliflower-varietal , Kartika Onion-foliar spray of multi K on standing crop @ 1ogm/lit at 50 days after planting Paroduction and majut technology of Ber, Anola, Lime, Guava

3.	**Animal Husbandry**	Balance feeding in dairy animals Improved cattle breed through Artificial Insemination Unit Use of Mineral Mixture in cattle feed Improvement of infertility in cow & buffalo Dairy Management Poultry Management Feed Management Production of livestock feed and fodder Management in farm animals Livestock feed and fodder production Introduction of new breed of poultry Breed improvement in goat Azola cultivation Complete feed block Artificial insemination Use of Urea Molasses Mineral Bricks in cattle feed Use of mineral mixture in cattle feed Azolla feed Poultry (Pratap dhan) Timely & line sousing green fodder production Foliar feeding Dap 2% flowering stage Nutrition management of milch animal by balanced ration prepared by wheat barn,gram, bran mustard, cake+salt to increase milk yeilding and improve health Introduction of urea molassis block +mineral mixture to improve health status and milk yield Collection of run of rain water of roof for animal drinking
4.	**Soil and nutrient management**	Soil Reclamation through gypsum Soil & water testing Resource Conservation Technologies Soil and Water Testing Vermi-compost production Organic manures production Integrated Nutrient management Production and use of organic inputs Organic farming Vbi-pass Nutrient technology Gypsum application Soil Reclamation thrugh gypsum Soil Reclamation thrugh vermi compost Seed and soil treatment with tricoderma against stem Rot Foliar spray of thio area @ 1 gm/lit of water at 55 days Use of simpolin vermi bed to prepare vermi compost
5.	**Aquaculture**	Rearing of IMC Ornamental fish rearing
6.	**Post harvest management**	Processing and value addition Income generation activities for empowerment of rural Women Rural Crafts Women and child care Low cost and nutrient efficient diet designing Preservation & value addition Post harvest technology Home Science Aonla, Honey and roasted gram, rice supplement with mid meal of anganwadi children Introduction of Nutrition garden with 10-15 fruit trees with seasonal vegetable to make available protected food for family to reduce

		vitamin/mineral deficiency Introduction of high nutrient efficient low cost diet is locally available food produced Procession and marketing of product of fruit, vegetables cereal, pulses
7.	**Mechanization**	Use of Shed Net Revolving Stool Protective cultivation Storage loss minimization techniques Small tools and implements Protected cultivation technology Water management Drip Irrigation Sprinkler irrigation Gum tapping Poly house cultivation Serrated sickle Double Layard water filter cloth Use of plunk tray with ccopit media Polu house low cost shed net house seedling, rasing and off season vegetable cultivation Introduction of hand wheel hoe for weeding implement specially for women Introduction of improved cooking technology of food developing low cost recharging structure of tubewell by run of rain water Minimize run of water and conserve moisture for Rabi by using Disc harrow and Disc plough rotabater

Arunachal Pradesh

Sl No.	Field in which technology was adopted	Name of the Technology Adopted
1.	Agriculture	Canopy management of khasi mandarin IPM in khasi mandarin hybrid Maize Production Pulse production technology Varietal introduction (rice, soybean, groundnut, potato, toria) Integrated weed management in mandarin orchard Oilseed production Varietal evaluation of linseed (Parvati) Varietal trial of maize Commercial cultivation practices of Rajmah Commercial cultivation practices of Soybean Commercial cultivation practices of pea management of mustard aphid composite carp farming for income generation in hill region supplementary feeding of carps for higher productivity Integrated farming system INM in Rice Demonstration on Mustard variety Demonstration of HYV Pea var. Azad

2.	Horticulture	High Density Planting (HDP) of Pineapple Integrated weed management in mandarin orchard Management of brinjal Bio control of diamond black moth on cabbage integrated pest management in apple Popularized the Tomato variety Oyster Mushroom production Honey bee pollination
3	Animal Husbandry	Piggery (Large black) Muscovy duck Rabbitary (Newzelan white) Broiler Farming Beetal Goat Dairy Farming 2011 Mithun Micro Chipping Hampshire breed piggery Integrated of Broiler Rabbit Integrated of Crossbred Piglet
4.	Aquaculture	Composite fish farming Integrated fish cum poultry farming IFS, on duck with fish on Jhal Kund Paddy cum fish culture Happa Breeding

Tamil Nadu

S.No.	Field in which technology was adopted	Name of the Technology Adopted
1.	**Agriculture**	CM in Groundnut ICM in ELS cotton MN Management in Maize ICM in Maize ICM in cotton Protray Nursery technology Sucking pest management in cotton Reddening management in cotton IPM in Paddy Popularization of improved varieties of Minor millets INM maize Bt. Cotton sucking pest management INM in oil seeds and pulses SRI in paddy 2012 INM in sugarcane Popularisation of JG11 of Bengal Gram IPM for pod borer damage in blackgram-vamban-7 variety Melia dubia based agroforestry systems Ailanthus based agroforestry systems Cotton+Teak cultivation Baby corn cultivation Baby corn cultivation Black gram drought and YMV resistant variety Co(s) 30 dual purpose sorghum variety for seed production and value

		added product preparation Control of mealy bug incidence in cotton Demonstration on baby corn cultivation and its value addition Demonstration on total mechanization in Green gram with ICMP ICM in paddy and RMD-1 Variety introduction ICMP for Paddy cultivation in saline soils ICMP for Pearl millet cultivation and its value addition Improved back yard poultry breed - NDC-1 INM and IPM in Black Gram Integrated farming system PPFM application for drought tolerance in pulses PPFM seed treatment for Drought tolerance Seed Treatment, Foliar application of borax and INM in Groundnut Sorghum Co S-30 cultivation Transplanted Red gram cultivation Transplanting techniques for improving red gram productivity Assessing the performance of high yielding pineapple cultivars in rubber based intercropping system Fertilizer management practices for tapioca in high rainfall zone Assessment of paddy variety ADT (R) 50 in Kanyakumari dist. Assessment of Black gram VBN (BG)-5 in Kanyakumari Dist. Management of multi nutrient deficiency in paddy for acid oil of high rain fall zone
2.	**Horticulture**	Bulb treatment in onion with bioagents Seed prepatation techniques in small onion Use of micronutrients for vegetables Mushroom cultivation IPM in Tapioca Papaya mealy bug management Fruit fly management in drumsticks Bacterial wilt management in tomato IDM for French bean Management of button shedding in coconut using coconut tonic Popularization of disease resistant of french bean Soil test based Nutrient application along with bio fertilizers and IMN in Cauliflower Popularization of CiTH3 bybrid tomato - High yielding and Leafcurl resistant hybrids Popularization of high yielding hybrid of TNAU Chilli hybrid Co1 Nutrient management in banana with IIHR banana special and covering bunches with polythene cover Integrated crop management practices in vegetable cowpea Cultivation and coconut G-4 Chilli variety introduction and fruit borer management Bhendi variety - Arka Anamika Bhendi variety - CO-Bh-1 Chilli variety - G4 Chilli variety - KKM-1 Cultivation of coriander Cultivation of seed propagated small onion Ecological fruity fly control in Drumstick Fruit fly control in Drum stick Introduction of Co-5 small onion Kitchen gardening Tomato-COTH-2 Tomato hybrid-COTh-2

		Tomato variety - KKM-1 Small onion seed variety Co(ON)-5 Foliar Nutrition for the management of berry drop in pepper Management of pseudostem weevil in banana Fertilizer management practices for tapioca in high rainfall zone Assessing the performance of Amaranthus varieties in banana based cropping system Assessment of the purple types of brinjal suitable for kanyakumari dist. Intehrated nutrient management in vegetables Integrated pest and disease management in vegetables Integrated management of late blight in potato Introduction of late blight resistant variety kufri giridhari Organic cultivation in vegetables Integrated nutrient management in culflower cultivation
3.	**Floriculture**	Enhancing flower production during off season in Jasmine IDM for powdery mildew in sunflower Improving Seed Setting, Varietal introduction and INM in Sunflower Evaluation of performance of rose variety Gladiator Hi-tech cultivation of cut flowers Integrated pest and disease management in cut flowers
4.	**Animal Husbandry**	Fodder Crop cultivation FMD Management in Dairy Cows IPM for paddy leaf folder Mineral supplement to dairy cows that yields less than 10 lt. Of milk/day, Mineral supplement for cows of the district Improved backyard poultry strains, Mixed fodder Enhancing the genetic makeup of local types with improved types of goats Tellicherry and sirohi Cage system of backyard poultry rearing under semi intensive system Comprehensive disease control in goats Goat Vaccination against HS, Anthrax, ET & PPR. Dewarming once in 3 months Acaricide 4 times in a year Green fodder – Calopogonium, Green fodder - hedge lucerne Green fodder – Stylosanthus, Green fodder - CN hybrid CO-4 Green fodder - CoFS 29 Homestead low cost incubator for hatching backyard poultry eggs Improved desi birds in cage rearing system Imprved Japanese quail breed - nandanam III Introduction Co-4 Fodder slips and fodder chopper for cutting fodder to minimize wastage Introduction of prosopis pod flour as an alternative concentrate feed for dairy cows Mineral mixture feeding to enhance fertility in cattle Oestrus induction in Post partum anaestrum cattle with CIDR Post milking teat dipping with antiseptics Profitable dairy farming practices Promotion of backyard poultry rearing with improved breeds Prosopis pod flour as an alternative concentrate feed ingredient Ranikhet disease vaccine-Lasota Ranikhet disease vaccine-Oral Pellet vaccine Ranikhet disease vaccine-RDVK Ranikhet disease vaccine-RDVK/R2B Three Tier fodder cultivation Bee-keeping, Improved back yard poultry breed - Vanaraja Improved backyard poultry rearing

5.	**Soil and nutrient management**	Tree planting in wastelands Management practices for secondary and micro nutrient disorders for tapioca in acid soil of high rainfall zone Compost techniques
6.	**Aquaculture**	Composite fish cultivation with stunted fingerlings in village common Ponds, Composite fish culture in village ponds Composite fish culture in village ponds with stunted fingerlings Crab fattening Fresh water fish culture stocking management in village coorani
7.	**Post harvest management**	Milet based value added products Masala Poser Preparation, Bakery Products preparation Processing and sale of non wood forest produces-Turkey berry, Gymnema leaves, Value addition of minor milets Low cost efficient vegetable preservator Maize de Sheller, seed cum fertilizer drill Fruit and vegetables preservation
8.	**Mechanization**	Cotton plucker for kapos harvest Artemia culture in small scale salt pan Energy saving devices usage like improved stove, vegetable preservator Improved charcoal cooker Sarai cooker Precision Farming, Mechanization Okra fruit harvester, coconut & climbing techniques, Citrus fruit harvester

Annex 4

Interaction with Krishi Vigyan Kendras – KVK wise details

Arunachal Pradesh

The State of Arunachal Pradesh has hilly terrain and is one of the richest hubs of natural biodiversity in the world. It is surrounded on three sides by Bhutan, China and Myanmar. It is the largest north-eastern state with an area of 83,743 sq. km and with an evergreen forest cover of over 82 per cent of its total land area. It receives an average rainfall of above 3000 mm per year and its climate ranges from sub-tropical in the south to Alpine in the north. The climate varies with elevation. Areas that are at a very high elevation in the Upper Himalaya close to the Tibetan border have an alpine or tundra climate. Below the Upper Himalayas are the Middle Himalayas, where people experience a temperate climate. Areas at the sub-Himalayan and sea-level elevation generally experience humid, sub-tropical climate with hot summers and mild winters. The state is inhabited by 26 major tribes and over 100 sub-tribes. With only 13 persons per sq. km, it has the thinnest population density in the country. There are 18 districts in the state.

Agriculture had been the traditional economic activity and farmers generally follow Jhum cultivation and Terrace farming. Gradual change can be observed and new cropping pattern with cultivation of cash crops is becoming popular with farmers, especially with progressive farmers. Among the crops grown here are rice, maize, millet, wheat, pulses, sugarcane, ginger, and oilseeds. Arunachal is also ideal for horticulture and fruit orchards The agro-climatic conditions help in producing tropical and sub-tropical fruits like Apple, Pineapple, Orange, Pear, Plums, Chestnut, Walnut, Guava, etc. Other major Horticultural products in Arunachal Pradesh are bamboo, spices, aromatic and medicinal plants, cardamom and mushroom.

District Map of Arunachal Pradesh

There are 13 KVKs in the state and most of these are governed by state departments. Out of these 13, six KVKs have been selected for the present study indicated by red star in the map.

The team visited 3 KVKs located at Papumpare, Dirang and Tawang and had discussions with Programme Coordinators, Subject Matter Specialists (SMS), and other staff. Interactions were also convened with farmers from various villages.

The team visited a number of villages to have a ground level experience of change that is taking place due to interventions. Farmers from various villages were invited in KVKs also for focus group discussions (FGDs).

1 KVK, Papumpare

This KVK is located centrally with wide area. There are 26 major tribes and 110 sub-tribes in the district. A number of local languages is the medium of communication. The KVK here is functioning under the Department of Animal Husbandry, Arunachal Pradesh.

The entire Papumpare district is mountainous forming a part of the Eastern Himalayas. The area comprises of a cross-section of the foothill region adjoining the border of Assam, the lower hills and the lofty mountain extending northwards. The natural vegetation comprises mainly tropical semi-evergreen and sub-tropical evergreen forests. At lower altitudes the vegetation consists of tall trees, shrubs, bamboo, wild banana, cane and various kinds of creepers, and at higher altitudes it is mostly composed of ferns and rhododendrons. In Papumpare district, there are two sub-divisions, which are further divided into ten circles. District headquarters is at Yupia (located at a distance of 22 km from the State Capital, Itanagar). The district occupies an area of 2,875 sq. kilometres (1,110 sq. mile). The literacy rate in the district is 82.14 per cent.

Although there is substantial land available and habitation is sparse, the growth of food grain production shows a declining trend due to crop losses because of natural calamities, low irrigation intensity and unavailability of terraced land in accessible areas.

Discussions going on in KVK Papumpare

KVK Operations and Challenges

Technology transfer to farmers requires knowledge of various major local languages. Although most of them understand Hindi but sometimes it is difficult to make them understand. Terrain in the district is hilly and difficult; roads are not good which takes too much time to travel from one place to another. For example, Mengio is located at a distance of 123 kilometers but it takes about 6+ hours one way. Providing services to such areas is a challenge. One needs to stay overnight at such places as it is not possible to come back the same day. The amount provided to various KVKs for the mandated activities is uniform across the country which makes it difficult to cater to the needs of farmers in areas with difficult terrain. The cost of travel is much higher in such cases as compared to plain areas. The amount provided for various services also does not allow officers to stay overnight. It has been observed that KVK is not able to provide services to the farmers living in distant and remote areas.

KVK in Papumpare as in other KVKs of the State is generally providing training to farmers as per mandated activity under outreach programmes. In-house training is not possible because of insufficient space and inadequate response from the farmers. KVK is housed in a rented accommodation.

Farmers follow the traditional system of farming. Change in mindsets is a difficult task. It requires community mobilization if farmers are to be trained in modern technology. KVK Papumpare is following a number of other approaches besides training to reach to the farmers. There are various Farmers' Clubs (FC) and Self- help Groups (SHG) with a group leader. Issues

relating to farmers' problems are discussed by these clubs and groups and brought to the notice of KVK. Accordingly specific programmes are organized to address specific issues. About 15 farmers' clubs have been formed and services are being provided by KVK.

Interaction with Farmers' Club in Borum Village (Filling farmer's schedule)

There are about 274 villages in the district and KVK has covered about 60 per cent villages so far. About 40 per cent have not been covered due to inaccessibility and various other problems relating to in adequate resources as mentioned above. In the 60 per cent villages that have been covered so far, various technologies have been transferred such as integrated farming system, integrated nutrient management, introduction of new varieties of rice, maize, mustard, etc., protected cultivation, commercial nursery, introduction of New Zealand white rabbit breed for meat purposes and so on. It takes about 2 to 8 years in adopting new technology at farmers' level depending upon the type of technology. Once the technology is proven it has spillover effect. Initially, farmers are not inclined to accept new technology as the traditional system is deep routed in their minds. When they see the success at some place they are more inclined to adopt the same. KVK distributed New Zealand breed rabbits which are demanded by other farmers also.

New Zealand breed Rabbit in village Karsingsa

Women farmer rearing a new variety of pigs in Mani

Orange cultivation had been the sole crop traditionally. The KVK suggested farmers to grow pineapple along with oranges. Oranges take 4 to 5 years or even more to give fruits while pineapple is an early crop. The new technology has improved the incomes of the farmers manifold. The inter-cropping of oranges and pineapples has been done under the Public Private Partnership (PPP) model. The other crop like banana has also been introduced along with oranges in some areas. Such success stories can be replicated in other areas as well which has the similar climatic conditions.

It has been observed that KVK functioning in collaboration with other organizations has better visibility as compared to its own intervention. Under Tribal Development Fund project which has been sponsored by National Bank of Agriculture and Rural Development (NABARD) and ATMA. KVK is partnering with NGOs at community level. Similarly, KVK is collaborating with ATMA in a number of activities. Such convergence has been fruitful. During FGDs it has come to light that although there are a number of departments and organizations that provide guidance to farmers, the KVK provides a common platform for knowledge sharing among various stakeholders through Kisan Melas and other events. It has also been indicated that

'group approach' of technology transfer especially in Arunachal Pradesh has proven better than the 'individual approach'. Kisan Melas are also providing a link for marketing of products.

There are many success-stories of technology transfer. Yet there are certain technologies that could not get success on farm trials. For example, aromatic rice variety created a lot of problems and could not get success in this area as its aroma attracted a number of insects and pests. The variety may require modifications or further research to tackle the problem.

There are a number of other attitudinal and operational challenges in transfer of technology. Big farmers have substantial income from traditional farming and do not want to experiment, while small farmers cannot afford to experiment, therefore are not inclined to go for new technologies. Another problem is of accessibility to planting material. In Arunachal Pradesh specifically, shops are not available for getting such material, therefore, farmers go for traditional type of agriculture. New technologies in certain areas are very costly like protected cultivation which requires poly houses which is a very costly affair. Such problems need to be addressed immediately by making KVKs a resource centre.

Planting material of this World famous Chilli is in demand (Papumpare village)

2 KVK, Dirang

KVK Dirang is in the west Kemang district which was established in 2005. The district has 4 development blocks: Dirang, Kalaktang, Nafra, and Thrizino-Buragaon with about 260 villages. Coverage till now is about 40 villages so far.

Subject Matter Specialist (SMS) Agriculture Engineering has pointed out that the implements and equipments that are coming for modernization of agriculture are for big farms. There is a need for small implements that could be used by small farmers as they have small

piece of land for farming. It has also been pointed out that there are a number of non-mandated activities which takes substantial time and mandated activities suffer. The officers are asked to go for election duties, fill a number of forms frequently and so on.

Efforts have been made for technology transfer but some technology cannot be adopted by farmers due to various reasons. On Farm Trial (OFT) has been organized integrating the crops of maize and paddy which has been successful; when other farmers learnt about it they wanted to adopt the technology but asked for seeds, etc. to do the same. KVKs are not mandated to provide seeds as such and resources are scarce in the district. Training to have bio-neem fertilizers has also been introduced but because of lack of inputs availability in the area farmers are unable to adopt it. Flax-seed became very successful as winter crop when integrated with wheat. RCM 76 maize crop which was successful in Nagaland failed in this area. This shows that new technologies are to be tested and modified as per local area climate. It has also been observed that generally big farmers get most of the services from KVKs and small farmers are left out due to various reasons.

During interaction with farmers in Sangti village

Local products like maize, kutu, barley, soya bean, etc. require marketing and farmers expect KVK interventions in this area.

SMS, Home Science, is providing training to female farmers in women centric activities. They are being trained in preparing fruit Jams, dying the clothes, packaging and so on. But again female farmers demand a value chain to sell their products. Kisan Melas are one platform where products can be displayed and sold.

There are a number of products which have potential for processing. There are also demands for such processed products. For instance, production of soya bean and maize is in plenty and there is a demand for soya bean milk and processing of maize. Farmers are of the view that KVK should take pro-active role in such type of value addition. During the interaction with farmers it was also brought to the notice that implements that are coming up for farming should be suitable for hilly areas. There is also a need to raise funds for farmers' training. A sum of Rs.40/- per farmer for food and Rs.75/- per farmer per day for hostel is provided which includes their food also. The amount is too meager to meet the expenses.

Interactions with farmers indicate that since other departments are providing subsidies expectations from the KVK is also of similar nature. Once farmers know that KVK will not provide anything in cash or kind they are not much interested in attending the programmes organized by them.

Interventions by KVK in fish rearing have become successful in this area and a number of small farmers have started a fish pond. For changing the cropping pattern from traditional cropping to cash crop, farmers demand fencing from KVK because animals spoil the crops. For starting other crops like cultivation of Kiwi fruit which can be grown in this area, farmers demand inputs from KVK. Only big farmers are able to grow such crops.

It has been observed that farmers are willing to adopt new technology only after seeing the success of a technology. The possibilities can be explored by KVKs to adopt some villages at a time and implement the technology. Once successful, this can be replicated in other areas. Farmers should be brought to see the success of a technology.

3 KVK, Tawang

The district has 8 blocks with more than 1,100 villages. The district is at an elevated area with frequent snowfall. The KVK is covered under the State Government, Directorate of Agriculture. The KVK has been able to cover 25 villages so far as the villages are in far-flung areas and officers are not able to access the remote places. They have stated that there is no provision and facilities for stay and that is one reason that they are unable to provide the services. The KVK formed 2 SHG and persuaded farmers to have vegetables cultivation. Onion cultivation has also been started. New varieties of wheat and groundnut have been introduced which has increased production. Many farmers have adopted ketaki variety for paddy. The cultivation of peas has also been started. The families in this area are not much interested in agriculture and males are doing the work of contractor and have opened shops while ladies are doing farming. The farmers have been taught the technology of pruning. KVK reported that they are helping the small farmers in nearby villages. Here also, families expect money or

subsidy or facilities in other kinds. The KVK functioning in rented places does not have any facilities for hostel, etc. Most of the programmes by KVK are being organized in the villages.

It has been reported that officers do not get accessibility of the new technology. A system should be put in place so that new technology could percolate at KVK level. There are problems of power and connectivity. Due to climatic conditions poly-houses are needed and farmers expect KVK to provide poly-houses.

Observations and Recommendations

8. To make a visible impact KVKs need various resources as per local needs. For example, to access various villages in the remote areas substantial budget provisions are needed.
9. For technology transfer inputs should come as a complete package. For example, introduction of New Zealand rabbit breed requires specific feed material, medicines, etc. Similarly, complete value chain is needed with introduction of new crops, varieties and so on. With introduction of new technology production increases. Forward linkages in terms of post-harvesting, transportation, packaging, marketing are necessary for new products or high yield products.
10. KVKs should be developed as Resource Centres which can provide/facilitate the access to inputs for farmers to adopt new technology. In case, new variety of seeds or fertilizers is introduced, farmers are unable to procure it at their own level. This is one of the reasons that technology did not get percolated at local level.
11. To make the technology transfer successful, it is necessary to release funds on time as per agro-climatic season of the particular area. It has been observed that KVKs under the state departments in Arunachal Pradesh have not received funds even for their salaries for the last six months.
12. Training to farmers should be so designed that it may be imparted at the time of sowing, harvesting and post-harvesting. Then only it would have its immediate impact. Funds should also be available accordingly.
13. Indigenous technology comes from farmers. A number of progressive farmers are experimenting on their own. Their technology should be taken a note of. It has been stated that experts during zonal level workshops require a written documents with source for such indigenous technology, while farmers are unable to provide such documentation. The possibilities of knowledge sharing of indigenous technology and replication should be explored.
14. While KVKs have been able to attend the problems of big farmers and get success in technology transfer, they are not able to cater to the needs of small farmers and farmers in far-flung areas. Most of the demonstrations, on-farm trials, seeds distribution, etc. are conducted for big farmers only. It has also been observed that same farmers get benefitted by KVKs again and again.

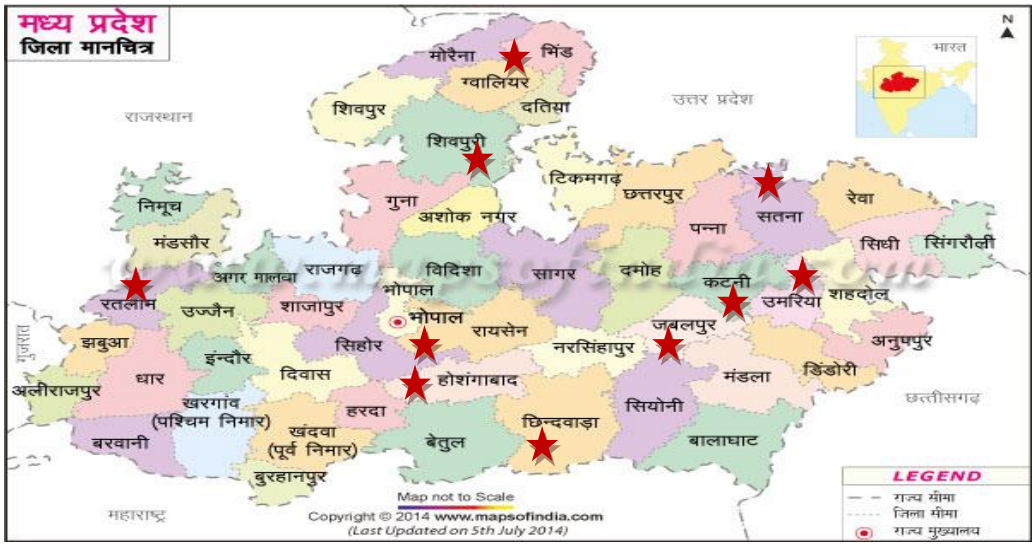
15. The spillover effect has been observed. Farmers adopt a new technology when they are sure about its success. It is therefore essential that success stories are brought to the doorsteps of farmers through videos, films or by taking farmers to the place where new technology has been proven. Group approach of transfer of technology should be preferred to individual approach. It is also important to have convergence in activities with various organizations for optimal utilization of resources and impact.
16. Technologies need to be developed and transferred as per local needs. For example, cultivation of oranges, Kiwi and pineapple is in abundance; technology is needed by farmers for processing, packaging and marketing of these products. It will also generate employment for the youth.
17. Power point presentations have been prepared for providing training to the farmers. These are in English language. Most of the farmers are illiterate. Almost none of them understand English. Possibilities can be explored to have material in local languages or through pictures to make these training effective. Presentations should have few slides with more practical orientation.
18. In other states like Tamil Nadu approach to adopt villages had been successful. Possibilities can be explored in other states also for greater coverage and impact. Every year certain number of villages can be adopted. A system of regular follow-up feedback loops and regular connectivity with farmers where new technology has been introduced is very much needed for better impact of technology.

Madhya Pradesh

Madhya Pradesh (MP) is the second largest state in the country with an estimated population of about 60 million. Agriculture is predominant sector in the state with 75 per cent of rural population largely dependent on it. This results in wide availability of manpower at reasonable cost. The agriculture sector forms almost one-third of the Gross State Domestic Product (GSDP) and forms the backbone of the MP's economy. The State has 5 crop zones. 11 agro-climatic regions and 4 soil types, which add to the biodiversity in the State and acts favourably for the production of various crop types. MP is the largest producer of pulses and oilseeds in the country. The state also has a major share of the national agriculture production. About 25 per cent of the pulses and 40 per cent of grams are grown in the state. The state is the largest producer of soya bean and gram and the second largest producer of jowar and masoor in the country. The agricultural land in the district Narsinghpur is considered to be the most fertile land all over Asia. The district is famous for its rich agricultural production. Output of the total gross cropped area, 59% is sown in the Kharif season and 41% in the Rabi season. MP leads in spices production with the largest production of garlic, accounting for 37 per cent of the total national production. The state is the second largest producer of coriander in the country.

Role of agriculture and allied sector including animal husbandry and fisheries is wider and more significant due to agrarian nature of the state economy. According to Census 2011, 69.8 per cent of the total rural workers and 85.6 per cent of the total workers in rural areas are dependent on agriculture for livelihood in MP which comprises 31.2% cultivators and 38.6 per cent agriculture labourers. MP has achieved an unprecedented 18.89 per cent growth in the farm sector including agriculture, animal husbandry and fisheries in 2011-12.

In the map districts covered for this study have been indicated by 'star'.



1. KVK, Shivpuri

Shivpuri is one of the 50 districts of the State. It comprises of 9 Tehsils, 1,417 villages (Census 2011) and 7 towns. Slightly less than 50 per cent of the population is below poverty line. The district has about 18 per cent population of scheduled casts and 13 per cent of scheduled tribes. The literacy rate is about 62.55 per cent which is lower than the average of the state which is 69.32 per cent (Census, 2011). Female literacy is much lower than that of males, which is 48.70 per cent against the state average of 59.24 per cent. The economy of Shivpuri is agriculture based and more than 80 per cent of the working population is engaged in agriculture activities. Wheat, barley, rice, jawar and bajra are the major crops that are grown in the district.

KVK Shivpuri was established in 2005 which became operational in 2007-08. The KVK is functioning under the state Government and therefore a number of activities are being assigned to the KVK from the university besides organizing mandated activities indicated by ICAR.

A number of technologies have been introduced in the area by KVK like new varieties of soya bean, system of double cropping, systematic tomato nursery growing, drip irrigation, application of gypsum and introduction of new varieties of groundnut. Cash crops like pumpkin, onion, capsicum, amla and guava have also been introduced in the district.

A number of villages were visited to understand the field level difficulties as well as success achieved. A summary of interactions with farmers is indicated below:

Discussions in Villages

In Ratour village there are about 450 families comprising of farmers and labourers. There are tube wells for irrigation and with the production of cash crops income has increased. The farmers are using good quality of seeds. The villagers were of the view that although KVK provides services to the village, there is a need to involve young generation with mechanism of agriculture. There is also a need for phone services so that advice can be provided as per the need of the farmers and cropping timings. Farmers in this village also stated that they are facing a problem of ‘mau’ in mustard and require guidance to deal with the problem. In Kiroli village farmers stated that KVK is providing help in advising about new varieties of seeds, fertilizers, crop pattern and process and nursery growing. They also tell about various implements. While there is substantial increase in the production of tomato due to change in method of nursery growing, there is no market for the same. There is not much income due to low sale price.

Interactions with farmers in Ratour

Use of groundnut peeling machine reduced drudgery

In this village the farmers were of the view that KVK should help in seed growing so that the same could be distributed to various farmers. Watershed programmes are also needed in the area as water level is going down.

It was observed during the discussions that women farmers are not generally being served as there is no female officer in the KVK and due to the cultural traditions of the state, women do not participate in the activities organized by KVK. In Timani village farmers stated that KVK does not have implements for display or accessibility to various varieties of seeds, therefore, some of the big farmers from the village participate in Agriculture Melas where they get knowledge of various implements and varieties of seeds, fertilizers and so on. Some provision should be made in KVKs itself for the benefit of the farmers.

Some of the villages which are yet to be covered by KVK like Girmora and Survaya were visited. In Girmora interactions were held with families who were a member of SHG which was formed by an NGO. They stated that there is a problem of water. There are also no tube wells in the village and therefore vegetable growing is difficult. The farmers were also not using any agriculture implements and doing the farming in the traditional manner.

Group of females in SHG in Girmora

No intervention from KVK Chowki village

Similarly, in Survaya village the farmers stated that they were aware of the KVK and listening the messages on radio but doing farming with traditional process only due to lack of availability of water in the area. There are no watersheds and water level has gone down due to which tube wells are not functional. They were of the view that new variety of seeds requires more water. If they opt for drip irrigation they need money to install the system. Some farmers also said that if they follow the advice of KVK like using less seeds in the field, the production will go down and therefore, they are following the traditional methods of farming. Such mindsets require continued interaction with farmers and showing them the success stories.

Narender Singh is a progressive farmer who has invented a power spray pump which costs much less than the pumps available in the market. He stated that although he invents things on his own and tells other farmers also, KVK helps him in a number of ways. For example, KVK helped him in dealing with the problem of worms in gram. KVK also advised him about new agricultural implements and their accessibility. Narender Singh is a big farmer and follows new technology of sowing, doing seed production following drip irrigation and so on. He was of the view that poly-houses are needed in the district and KVK can help farmers to install poly-houses.

Focus Group Discussions

A Focus Group Discussion was organized in the KVK on 25.2.2015, which was attended by 22 persons including farmers, KVK officials, representatives of NGOs, experts in agriculture. It was brought to the notice that about 80 per cent farmers have come from outside like Punjab, Haryana and settled down here. Local farmers are not getting involved in modernizing agriculture.

FGD at Shivpuri

It was pointed out that there is a scope for growing guava, lemon, pomegranate (anar) etc., but appropriate technology for growing these fruits is not available in the district. Farmers also want to see how to grow these crops. The tissue culture plants are also needed. Poly-houses will be successful owing to water shortage which should be looked into by KVK.

There is ample scope for exports of agri-products at international level. While products of China are exported in other countries, Indian products do not have any international market which needs to be explored. Processing units are also required, because when production of various crops like tomato, amla etc. will increase their selling price will go down. If there are processing units value addition would be possible. Solar energy system can be installed in the district and common tube-wells system should be installed for irrigation. Shivpuri has a mix culture of Rajasthan, Bundelkhand and Malwa. The farmers from various cultures should mix up and share their knowledge and expertise. The KVK can play an important role in these areas.

KVK should also be given responsibility to implement the Soil Health Card System; there had been a laboratory in the *mandi* but that is not operative. There should be a system of new technology transfer to KVKs so that it could percolate among farmers at an early date. Supply of funds, seeds, fertilizers, etc. should come on time as per the season. Awareness camps at various places are also needed with continued follow up.

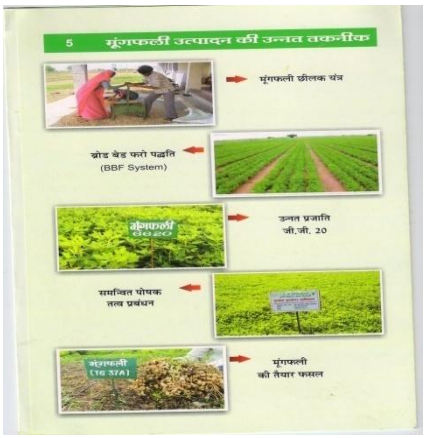
Challenges in Transfer of Technology

1. About 70 per cent time of the officers goes in non-mandated activities and coordination with line departments. There is also a problem of electricity which hampers various activities of KVK; connectivity with internet, mobile etc. is also irregular or absent.
2. It has been pointed out that there is no mechanism of technology transfer to KVK. The scientists explore themselves or go for training to various places and in the process they learn about the new technologies. It takes substantial time to transfer the technology because first the technology has to be transferred to KVK then it is tested in the district

and as a third step it is transferred to farmer. After the success of a technology at farmer level, other farmers come forward. The process takes about 5 years depending upon the type of technology.

3. A number of agricultural implements are available for mechanization of Indian agriculture, but their adoption by farmers has numerous challenges. Firstly, KVK does not have implements to show the farmers and therefore, farmers are not sure of the operations and utility of various implements. Secondly, most of the implements are very costly and farmers are unable to buy. Thirdly, there are no resource centres where such implements could be kept and farmers could hire these. The similar is the case with new varieties of seeds, etc. Non-accessibility of new varieties is one of the major challenges in transfer of technology.
4. KVK is producing seeds for various varieties of products but that is given to the university and these are not distributed among the farmers.

   With the introduction of new technology, production has increased. But there are difficulties in marketing and processing of products, for example, farmers are not getting any market for the production of *amla*. Soy bean production has increased manifold and its processing is needed at local level. There are oil extracting units but there is demand for other products of soya bean also.



Display material at KVK Shivpuri

There are success stories of technology transfer, for example, short duration soya bean variety has been very successful due to climate change and short duration variety has made double cropping possible. Similarly, tomato nursery growing has become popular among farmers and production has also increased with the new technique. Radio message programmes by KVK for providing advice has made KVK visible among farmers.

Display material has been developed by the KVK for perusal of farmers visiting KVK. The display is attractive and provides useful information.

2 KVK, Jabalpur

It was set up in 2004 under the administrative control of Jawahar Lal Nehru Krishi Viswavidyalaya (JNKV) with adequate infrastructure facilities. The district is centrally located in the state and falls under commove plateau and satpura hills agro-climatic zone. The district has seven blocks and about 1,350 villages. These villages are spread over in 5,19,757 ha of geographical area. Climate of the district is congenial for horticulture crops, and minimum and maximum temperatures of the district vary from 4º-47º during the year. Rain-fed cultivation is the major practice among the farmers in the district. Total population of the district is 2,151,203 and population of the farmers is 9,23,863. Total number of farm families are 3,99,440, large farmers are 1,71,043, medium are 52,582, small farmers are 26,079 and landless farmers are 1,49,731. Paddy is the important crop followed by Arhar and Urd in kharif, whereas, wheat, gram and lentils are grown in Rabi season. The observation of the team on agriculture production is that, about 20 per cent of agriculture production has been increased after the intervention of the KVK in general

Interaction with KVK scientists along with the Horticulture/Agriculture Extension officer

KVK Infrastructure and Initiation of Farm activities

The KVK, situated within the campus of the State Agriculture University (SAU), is fully equipped in terms of infrastructure and staff. Apart from the Project Coordinator, there are 6 SMS in Entomology, Agronomy, Food Science, Extension, Education, Soil Science, and Horticulture, along with 3 technical support staff. The annual budget of KVK was Rs. 72 Lakhs in 2011-12 which was increased to Rs. 102 Lakhs in 2013-14. The KVK has its own building. Availability of furniture and equipment are not up to the mark.

Out of the seven blocks in the district, the KVK has covered six blocks which includes a total number of 70 plus villages in the district. Since inception, more than 10,000 farmers have been benefited due to the intervention of the KVK in the district. It has been observed that majority of the farmers (95%) covered by the KVK are located more than 10 km of distance from the KVK.

It has been seen from the official records that a large number of requests from farmers in terms of information on cultivation, assistance in implanting technology, weed management and soil testing etc. are being received in the KVK. Most of these are attended as per information given by the officials.

The KVK has mainly disseminated the following types of cultivation technology to different farmers across the district:

- Introduction of medium duration pigeon pea variety ICPL 88039 with integrated pest management
- Growing of gram after paddy under rain-fed situation
- Heat tolerant variety of gram JG 40
- Plantation of eucalyptus of degraded land
- Wasteland development through bamboo plantation and use of water saving device
- Ridge and furrow planting of YMV resistant variety (JG 9752) of Soy bean
- Introduction of wilt resistant gram variety JG 63 with IPM module
- Planting method (SRI) of Paddy hybrid
- Alternate cropping system (Trapa-Wheat) for water logged low laying areas
- Intercropping of grain crops under amla and eucalyptus
- Cultivation of berseem with oat
- Nursery management and development of planting material
- Introduction of Khrif Onion etc.

KVK Jabalpur has assessed about 121 new technologies on 597 farmers' field in 93 villages during the last five years. About 69 technologies were demonstrated through Front Line Demonstration (FLDs) covering 196 ha of land. Under the capacity building programme a large number of training programmes were organized for about 14,843 farmers so far, which includes female farmers. The KVK has initiated ***Kishan Mobile Sandesh*** to speed up the technology transfer process in the district.


Intercropping wheat- Eucalyptus farmers of Rehpura village

Keeping in view the various activities of farming (agriculture, horticulture, dairying) and vocational training, the KVK Jabalpur has received the best KVK award of 2010 for excellent performance not only in agriculture and horticulture but also in organizing variety of training programmes for making rural youth self-sufficient in tailoring, embroidery, bakery, fruit production. E-linkages, Kisan Mobile Sandesh, crop cafeteria, fruit cafeteria, SRI method of paddy, etc. were also organized. As a result, overall crop production was found increased to the tune of 20 per cent with about 20 per cent reduction of production cost in the district.

Interaction with the Farmers

The study team visited a number of villages to interact with farmers such as Rehpura, Muskara, Verkhera, Mohtra, Sarsawa, Jujhari, Muskuti, Bitola, Nemai etc. From the interactions it emerged that the role played by the KVK is very crucial for cultivation of Rabi & Kharif crops, horticulture production, availability of seed, Planting material, and various agriculture related management activities. The farmers of these villages have highlighted the contribution of KVK, as a result of which, production cost has reduced substantially and production has increased to the tune of about 20 per cent. These farmers were of the opinion that more facilities may be provided to agriculture scientists working in the KVK in terms of their carrier progression, transport facilities, capacity building etc.

Some Success Stories

Re-establishment of Soybean in the District

KVK identified the Problem:
Heavy infestation of insect, pest and diseases, heavy erratic rainfall pattern and vagaries in the climate, use of high seed rate and improper sowing time and method.

KVK Intervention:
Introduction of High Yielding variety resistant to YMV: JS 97-52, early sowing with seed rate of 75 kg/ha, ridge and furrow system of planting etc.

Outcome:
Soybean re-established in the district (5500 ha area) with increased production (39325 q/annum), monetary return of about Rs.7.86 crores/annual in the district.

Similarly, KVK has also introduced diversification through Trapa-wheat cropping system, and as a result, increased the profitability over foodgrain production i.e. Rs. 82,750/ha/annual and land use pattern of paddy/fellow-wheat cropping pattern.

A Case Study

Shri Atul Persoia, a young energetic graduate started door-to-door distribution of milk with one buffalo. His continuous approach, hard work, and interest promoted him in multiplying milch animals up to 100, thus becoming a dairy owner during the period of less than 10 years. The increase in number of animals encouraged Atul for generation of finance facilities. He was helped by the State Bank of India in getting loan. Now he is providing employment to 12 workers for cultivation of fodders on five acres of land, and milking, cleaning and maintenance of the dairy. Now his dairy work is enriched with more than 150 animals and for the proper utilization of dairy waste a vermi compost unit and gobar gas plant has been established at his place. At the beginning, day-to-day guidance was given by the KVK official.

Plantation of Clonal Eucalyptus at Farmer's Field- An Agro forestry Model

Shri Sanjay Srivastava has 2.5 ha land in village Imalia near Maharajpur, district, Jabalpur which is surrounded by sewage drainage nalla with undulated topography which cause soil erosion due to high rate of run-off resulting into low productivity of crops. The scientists of KVK visited the site and suggested the plantation of eucalyptus clone on boundaries and planting of Napier grass across the slope to check the run-off. The owner of the land took interest and agreed to plant the clone as per the suggestion. A total of 540 clonal plants were harvested and sold directly to timber merchants for the purpose of poles (balli) @ Rs. 4000/ton. The productivity of grain crop was also increased as the plantation helps to check run-off and removal of fertile soil. His income and productivity increased manifold due to this experiment with the help of the KVK scientists.

Key Recommendations:

On the basis of the discussions with the officials of the KVK, the following recommendations were emerged:

- Additional infrastructure facilities are needed for development of technology park, technology desk and visitors' gallery
- It has been suggested by the scientists that a national publication should be brought out elaborating the activities of the KVKs and its innovations for mass awareness.
- KVK scientists should be exempted from non-mandated duties such as election duties.

3 KVK, Katni

The KVK was established on 7th October, 2005 under the administrative control of Jawahar Lal Nehru Krishi Viswavidyalaya (JNKV). The KVK is situated on the Jabalpur Katni NH 7 at Pirodh village. The visiting team has observed that the KVK is not adequately equipped with infrastructure and staff. Apart from the Programme Coordinator, only three subject matter specialists (SMS) out of the six sanctioned positions were in position. Three SMS were found deployed with the university (SAU). The existing SMS were also attending the administrative and accounts maintenance of the KVK. KVK Katni has a big agriculture farm (45 ha) but the SMS agronomy is deployed with the other department.

The district has six revenue blocks, 409 panchayats and total number of villages is about 911. Total population of the district is 10,64,167 along with the literacy rate of 52.17 per cent, SC/ST population was 35 per cent and average landholding is 1.41 ha.

Interaction with the Farmers: During the discussions it has been observed that the ***Kisan Mobile Sandesh*** service has been very effective in the district. With the mobile service KVK officials could cover about 500 villages for farm activities in the district. During the year under report, about 250 farmers have been trained by the centre. More than 5,000 farmers have been benefited through FLD in different villages. Another important aspect that came to light was that marginal and small farmers have not been covered through FLD activities, may be due to their small landholdings. As indicated in the official record (Year Planner), the major time spent by the officials of the KVK goes in preparation of monthly and quarterly progress reports and other miscellaneous reports to be forwarded to higher officials. Various technologies have been introduced like disease management in Arhar crop, weed identification and its management in oilseeds, conservation of green fodder through silage and hay making, use of serrated sickle for harvesting of paddy, commercial broiler production, seed Production training, use of high yield varieties JG 11 + NPK, demonstration of tomato variety etc. KVK also organizes Kisan Gosthi from time to time and facilitates formation of SHG and farmers' groups.

Interaction with women farmer Smt. Utara Bai Thakur,Award winner

While interacting with farmers in the villages Negawan, Ritua, Banda, Banta, Ligri, Lakhapateri, Bhanpura, Rajikala, jarwahi, Niwast, and so on, it was indicated that KVK is the only knowledge imparting agency in the district for the farmers which demonstrates HYV, and train the farming community to some extent. But the marginal and small farmers' income from the agriculture was constantly in reducing trends and the KVK has not been of much help to them. Services of KVK are not useful to these farmers. These farmers are poor and some of the farmers have stated that they are not getting any kind of seed and other assistance from KVK. On the other hand, the KVK officials claim that seeds are distributed to these small farmers also but they consumed it for personal use. Another group of farmers has suggested that the KVK should provide the kind of seeds which require less irrigation as the lands they possess have no irrigation facility. Another problem faced by marginal and small farmers in the district was that, a substantial proportion of the crop is destroyed by the wild animals (pig). These farmers feel that Government should provide subsidy for fencing their farms through KVK. An important point was also shared by the farmers that Government is giving fertilizer subsidy to farming community but why the manufacturing of organic fertilizer is being ignored by the Government. Farmers engaged in organic farming should be encouraged by giving certain incentives.

A Success Story- Hybrid Paddy Production

Smt.Gyanabai Haldkar, aged 38 years in village Bunda, has set an example of successful production of hybrid paddy based on integrated package on technologies provided by KVK. Village Banda is situated at a distance of 10 km from KVK Katni; the beneficiary had been in regular contact with KVK. She holds 7.5 acres of agriculture land with irrigation facility. In 5 acres of land she grows paddy. Under the guidance of the KVK she started growing Pusa sundha 3 in place of earlier seed through SRI method. She laid Paddy nursery under the guidance of KVK scientists. Based on the soil test she applied NPK whose dose was calculated on the basis of soil test crop response technique by setting the target yield of 45q/ha. In addition, she applied Blue Green Algae (BGA) and bio-fertilizer in accordance with the recommended doze. An average yield of 49q/ha was obtained after following the above KVK techniques. Though the cost of the production was higher than that of the traditional method yet total output doubled. Her income has increased by 15 per cent and she has become the role model in the village and adjoining villages.

Cauliflower Production- A Success Story

Shri Sadhu Kushwaha, aged 40 years and resident of Village Lingri, Block Bahoriband has also set an example of successful production of cauliflower based on integrated package on technologies provided by KVK Katni. Village Lingri is situated at a distance of 15 km from KVK Katni. He holds 5 acres of land and grows vegetable in 2.5 acres. After the intervention of KVK he started growing hybrid varieties of cauliflower in place of local/old open pollinated varieties. He adopted the integrated approach for production. He laid cauliflower (hybrid var-Madhuri) nursery following improved nursery management technique i.e. seed treatment by *Trichoderma Vridi @ 4 g/kg seed*, seed sowing on 10 cm raised bed, use of neem oil @ 5ml/ha, under the guidance of KVK. He transplanted the 15-18 days old seedlings in one acre with intercropping of coriander in one row on 6:1 ratio for control of insects/pests. With this technique although the cost of production has increased but at the same time production per ha. yield has also increased, which has resulted in enhanced income per ha. He has now become a role model for his own village as well as for nearby villages.

As mentioned above, the KVK is not well equipped financially or in infrastructure. Total budget allocation in 2011-12 was Rs. 35 lakhs, which was increased to Rs. 47 lakhs in 2013-14. No proper office building, furniture and equipment are available with the centre. The inadequacy of human resources was also observed during the visit to KVK.

During the last five-year period, KVK has covered about 372 villages in the district in almost every block of the district and about 7,664 farmers have been benefited with the improved cultivation techniques. Same farmers covered in various activities cannot be ruled out. Coverage of 372 villages indicates that no new villages have been covered.

Out of various activities of KVK, majority of farmers (about 70%) have benefited through farmers' training organized by the KVK, followed by awareness programme (20%). The number of farmers benefited through technology dissemination was only 1.1 per cent, whereas, the proportion of farmers benefited through FLD & OFT was about 5.7 and 2.2 per cent respectively.

Key Recommendations

1. There should be coordination among universities, research institutes and line departments
2. There is a multiplicity of organizations that are providing extension services to the farmers. The farmers were of the view that KVK should be nodal agency for all the extension work and there should be a close coordination between all the departments.
3. Separate technology innovation is needed for medium and small farmers as they are being neglected.

4. KVK gets a revolving fund from ICAR. There are some KVKs that have managed their form area very well and are producing a number of crops, seeds, etc. The KVK Katni is one of such KVKs. A proposal was brought out that incomes from the forms of KVKs will be allowed to be deposited in the revolving fund and not to be transferred. This will help to initiate various other activities at the end of KVKs.
5. Recent technology should reach to KVKs.
6. There should be availability of new seed/planting material to the KVKs.
7. Improved chemical (pesticide) with literature should be available with KVKs.
8. Supply of improved agriculture equipments should be made available to KVKs.
9. KVK scientists should be exempted from the general duties such as election duties so that they can concentrate on their farm activities.

4. KVK, Umaria

The geographical area of Umaria district is 4,503 sq. km, tribal population (49%) dominates the district. The district has three blocks (Karkeli, Manpur and Pali) and there are about 683 villages. The district has a total number of 234 gram panchayats. Total population of the district is 5, 15,963 (2011), and literacy rate is about 59 per cent. Average landholding size is 0.17, single cropped area is 35,117 ha and double cropped area is 85,050 ha in the district. The higher proportion of land is under forest area (53.0 %) i.e. 2,367 sq. km and net cultivated area is 1,051 sq. km. The location of the district is under agro-climatic zone II i.e. northern hills zone of Chhattisgarh and popularly is known for Bandhavgarh National Park. The major portion of the soil of the district is red and yellow followed by sandy and red-mixed black. The average rainfall is 1,374 mm. The major crops in the district are paddy followed by maize and minor millet. Mustard/toria and soy bean crops are newly introduced crops. Major horticulture produces are mango and guava. Tomato, potato, brinjal and chilly are grown as vegetable crops.

Interaction with farmers at Tali

The KVK in Umaria district was set up in the year 2007. The host organization of the KVK is Jawahar Lal Nehru Krishi Viswavidyalaya (JNKV), Jabalpur. The KVK has 20 ha of agriculture farm in its occupation for OFT and demonstration purposes with tractor, cultivator, MB plough and Leveler. Manpower available with the KVK is not adequate as horticulture, plant protection and home science SMS are not posted with the KVK. Three SMS (Agronomy, Agri. Extension and Animal Husbandry) are working with one or two support staff. The KVK has its own building which is partially furnished with office equipments. The budget allocation of KVK was Rs. 28 lakhs in the year 2011-12 and it was raised to Rs. 40 lakhs in the year 2013-14.

The SMS in position in the KVK have stated that productivity in foodgrains production has increased due to intervention of KVK in villages. The substantial enhancement in productivity is the result of the OFT/FLD and overall guidance from the KVK. The KVK is functioning from its new building since July, 2014 which is considered to be at a remote place with scarcity of water. During the discussion it was observed that new variety of seeds have been introduced by KVK in all the three blocks of the district. For example, in paddy cultivation, the centre has introduced short duration variety suitable for timely sowing and low water requirement, viz PS-3, PS-5,HMT, MTU-1018, JRH-4 &5 etc. Similarly for wheat, gram, mustard, maize, soybean & black gram an improved variety was disseminated by KVK scientists in the villages.

Farmer showing the weed grass in the field

The coverage of OFT and awareness programme by the KVK seems to be the highest as compared to the other activities initiated by the scientists working in the centre. A total of about 40,000 farmers have been benefited by these farming activities of KVK, Umeria as per records.

1. Success Story: Kharif Onion

Mr. Safar Ali of village Barhi, block Karkeli, is an example of the success story in the district for technology transfer. He holds 1.5 acres of land and cultivates paddy and wheat, and in some portion vegetable, during Rabi season for his family consumption. He attended a farmers' fare organized by KVK scientists. During this Fare KVK advised him to grow Onion in Kharif season. Earlier, he was growing Onion in Rabi season. Kharif season onion was new concept for him but he took chance and cultivated kharif season onion in a small part of his land on experimental basis. He started the cropping under close supervision of KVK, selected the variety ADR and laid out the nursery 15 cm higher from the ground level, incorporated well prepared FYM, arranged for proper drainage arrangement, sowed the seeds in line and then covered them from mulch, he also irrigated the land in 3-4 days interval for a month. After the crop was ready he sold the green leaves and produced 2-2.5 q/160 sq. miter areas and received Rs. 8000 from market. After that, he decided to cover multiple area under kharif onion and started to earn more and more every year.

During the interaction with farmers in the villages – Mehori, Dhanwahi, Ranpur, Karkali, Dhanrodh, Tali, Sarotra, Dadri, Chorkho, Dhaka, etc. the following suggestions emerged:

- KVK should initiate more awareness programmes through advertisements.
- The seeds given by the Government functionaries are not of good quality as 15% out of the total quantity is a waste. KVK may be a resource centre for seeds.
- Employment avenues should also be generated by the KVK.
- Better methods for vegetable cultivation should be popularized by KVK.
- Farming technology suitable to less irrigated land should be provided by KVK.
- Fencing of agricultural land is a big problem in the Umaria district as the forest area is large and wild animals destroy substantial portion of the ready crops. Fencing can also be done combining the farms of various farmers. Farmers are ready to take the initiative if some subsidy is provided.
- District Umaria is a tribal belt, Government should introduce some scheme for the welfare of the local farmers of the area.

Key Recommendations

- There is scarcity of water in the farm owned by KVK itself, as a result, its own farm demonstration is not at all effective. Some budgetary allocation is required keeping in view the water scarcity of the KVK.
- Scientific Manpower allocation within the KVK needs to be given an attention by the sponsor.
- A system of collecting Feedback from the farmers on regular basis may bring better results within the district.
- Timely release of funds should be given top priority.

5 KVK, Satna

Satna district is a part of the history of the region known as **Baghelkhand**, a very large portion of which was ruled by the treaty state of **Rewa**; while a small part towards the west was ruled by the feudatory chiefs, holding their States under sanads given by the British rulers. There were eleven sanads in all; important ones being Maihar, Nagod, Kothi, Jaso, Sohawal and Baraundha and the five Chaube Jagirs of Paldeo, Pahra, Taraon, Bhaisundha and Kamta-Rajula. The modern Satna district of Madhya Pradesh has 8 blocks, 1,816 villages scattered over 7,42,000 ha geographical area.

The population of Satna district was 2, 228,619 in 2011 which includes about 78 per cent of rural population. The literacy rate is 73 per cent whereas the state literacy rate is 70 per cent. The standard of living index for the district is considered to be very low. Total number of farmers in the district is 2, 48,088 and the net sown area in the district is 3, 41257 ha and gross cropped area is 4, 98,228 ha. Total forest area is 2,040,00 ha and land under non-agriculture is 67,000 ha. Major crops in Satna district are Paddy, soy bean, black gram, wheat, chickpea and lentil. Small is beautiful is a good saying, but it does not appear to be good when it comes to landholdings in agriculture. More than 78 per cent of farmers in Satna district own two and a half acre or less land. Their share of cultivable land is about one third of the total available agriculture land in the district. Majority of the farm families in the district follow rice–wheat cropping system.

KVK Satna was set up in the year 1993 and is functioning under Deendayal Research Institute founded by Late Shri Nana Ji Deshmukh, who is committed to serve the poorest of the poor. The KVK is located at Majhgawn in Satna district and is functioning on the principles of Late Shri Nanaji Deshmukh that include:

- Motivation , Education, and Empowerment

Display at KVK, Satna

Samples of high yielding variety seeds

About 77 per cent farmers in the district are marginal and small farmers, as a result, education and empowerment are the key challenge areas for the KVK. The KVK has done intensive work in 302 such villages where the farmer's landholding is small. Mobile advisory services were launched in 2004 by the KVK which has covered about 33,636 farmers through ***Kishan Portal***. Apart from setting up of the Krishi Vigyan Committee at block level, the KVK has made another effort to appoint *Krishi Gyan Doot* in 246 villages across the district. For marginal and small farmers KVK has constructed about 308 irrigation Ponds covering all the eight blocks.

Efforts have been made by the KVK for developing self-reliant village through prosperous family, self-reliant family, social conciousness, public amenities and clean and green villages. For this purpose, KVK Satna has introduced ***Samaj Sewi Dampati*** in every village to generate awareness and to initiate action.

KVK, Satna has its own agriculture farm scattered in 30 acres of land which is being used for demonstration purposes for various corps (agriculture and horticulture) in Rabi and Kharif seasons. The KVK, Satna is also engaged with non-farm sector activities such as Poultry, Goatary, Fish Farming, Dairy, Mushroom farms, Organic fertilizer, Mechanic training for farm implements, Value addition to forest produce etc.

The KVK is maintaining economic and scientific aspect of animal breeding. A large number of Indian rare breed is available in the centre. The centre was started with very small number of animals, now it has the representation from every state and the centre is doing various experiments on cross-breed.

A substantial area of land is covered under horticulture crops in the farm managed by the scientist of KVK, Satna. A large numbers of visitors from within the district and outside are coming to obtain the farm technology from the KVK. As reported by the Programme Coordinator, till now the KVK has assessed about 120 agriculture technologies consisting variety of crops and thousands of farmers have been benefited with this effort.

Late Nana Ji Deshmukh wanted the KVK to be known as a place of modern field laboratory. As a result, agriculture, horticulture and animal husbandry are the priority areas of the KVK. Apart from the PC, there are four SMS in agriculture extension, animal husbandry, agronomy, and plant pathology. Agriculture Engineering and Soil Science SMS are required in addition to the existing one. The infrastructure which includes furniture and equipments, administrative block, laboratories, training halls, kisan hostel, staff quarter is adequately available with the KVK.

The annual budget of the KVK was Rs. 65 Lakhs in the year 2011-12, which was increased to Rs. 81Lakhs in 2013-14. The KVK has a revolving fund; it has a corpus of about

Rs.42 Lakhs. During the year 2013-14, the KVK has initiated its activities in 7 out of 8 blocks covering 411 villages and 4,400 farmers across the district.

Interaction with the Farmers

The visiting team interacted with the farmers gathered at the KVK on their routine visit and some of the villages visited by the team are karogohi, Barkhera, Pagarkhund, Patni, Devlaha, Padharkachar, Barua, Majhgawan, etc.

FGD organized for farmers at KVK, Satna

Success Story: Drought Mitigation Intervention of KVK

Shri Basant Kumar Trivedi, village Pindra has obtained training from KVK about how to grow high yield variety of horticulture crops. As per the guidance of the KVK scientists, he experimented vegetable in a small farm and applied the techniques suggested by the scientists. The results were very encouraging and he thought to increase the cultivation crop by crop. Every year his earning from horticulture crop started increasing. As on today, he is growing vegetable in five ha of land and engaged four persons on payment basis in his occupation and earning a handsome income for his family.

Key Recommendations:

- There should be more custom hiring centre in the district and these centres should function under the KVK.
- It has also mentioned by the KVK officials that there should be crop insurance for the farmers and the KVK should also be taken into confidence for this purpose.
- There should be a provision of soil testing laboratory with scientific staff and other equipments in the KVK.

- It has also mentioned that the backward districts should be given more importance in terms of allocating budget for agriculture development.
- Since KVK, Satna is an NGO, it is also associated in organizing other training programmes sponsored by various other organizations, whereas, funds received from ICAR for training are very meagre, which should be increased.
- Seed and fertilizer should be made available to farmers at the time of the sowing season.

6 KVK, Bhopal

KVK, Bhopal was established in 1979 and is directly under the administrative control of ICAR located in the campus of the Central Institute of Agricultural Engineering (CIVE). Topmost priority area of this KVK is Agricultural Engineering followed by Agronomy and Horticulture. There are 4 SMS working in this KVK. Total budget expenditure for the year 2013-14 is Rs. 70.93 lakhs.

Agricultural land use is 1,53,000 ha, 71,000 ha, and 2,25,000 ha for net sown area, area sown more than once, and gross cropped area respectively in the district. Sources of Irrigation are canals, tanks, open wells, and bore wells. Major crops grown in the district are soy bean, maize, chickpea, wheat, mango, papaya, guava, orange, chilli, garlic etc. Average rain fall is 1,154 mm. Fifty percent of the district's area is cultivable. Forest cover is 44,000 ha. The District has 603 villages out of which KVK has covered 113 villages so far.
The KVK is equipped with latest equipments, machinery used for mechanised cultivation, and post-harvesting methods.

Demonstration of agricultural implements in CIVE in collaboration with KVK

Coverage & Outreach of KVK, Bhopal in the past 5 years

KVK, Bhopal is carrying out the activities in two blocks and 6 villages every year benefitting approximately 1,130 farmers in those villages.

Specific technologies introduced by the KVK in the last 5 years are – Tractor operated Seed-cum-fertilizer Drill, Straw Reaper Combine, High yielding Variety Okra-VRO-6, High yielding variety of Brinjal Gole, High yielding variety – Onion-AFDR, and Soybean (JS-93-05) etc.

Use of agri-equipment on custom hiring basis by farmers (Vasia village)

Field demonstration in Dangoroli Village

Display of Technology in Crop Cafeteria

The KVK has demonstrated many technologies in its crop cafeteria. Crop varieties such as cow pea (kasha Kanchan), Okra (VRO-6 & NS-801), soybean (JS-9560 & JS-9305), Red gram (TJT-501, JKM-189 & ICPH-2671), wheat (18 varieties) etc. were grown in crop cafeteria for demonstration purposes.

Efforts of KVK in Women Empowerment

KVK, Bhopal's contribution in capacity building programmes for women in rural areas

The KVK through its SMS, Home Science has trained rural women to prepare soybean milk paneer, soybean snacks and help in marketing the products in Bhopal.

Focus Group Discussion with farmers

A focus group discussion was organized in Bagrodia village which was attended by about 25 farmers. It was observed that KVK, Bhopal is focusing on fabrication of farm equipments, and mechanisation of entire farming & post-harvest methods. Its sole purpose is to propagate the use of high-end farming equipments, adoption of engineering practices in agriculture to achieve resource conservation through technology and machinery.

Custom hiring is helping small-landholding farmers who cannot afford to buy agri-equipments. The KVK is acting as a mediatory with banks/financial institutions for setting up of custom hiring centres by the trained agri. graduates/diploma holders to facilitate financing of agricultural machinery. During the discussions it was pointed out that KVK is supplying high-quality seeds only to select farmers for demonstration of technologies. All farmers are thus depending on Input Dealers for quality seeds who are charging exorbitant prices. Farmers wanted KVK to serve as resource centre. It was also mentioned that the involvement of KVK should be there in assessment of crop loss for insurance purposes along with the local revenue officers. Farmers are of the view that there is no reasonable minimum support price (MSP) for their produce and they are suffering with subsistence income due to high input costs. They are of the opinion that there should be a separate MSP for different regions of the state as there are no uniform conducive, encouraging conditions in all the regions.

Challenges in Implementation of KVK Technologies

Farmers opined that KVK technology leads to more yield, enhanced income, and promotes entrepreneurship among youth. Women folks are also benefitted from the extension services of KVK. But farmers are depending on Input Agents due to their strong network. These input agents are providing seeds, fertilisers, and pesticides etc. on credit basis and counsel them to buy more and more input ingredients from them which create problems. The KVK has very limited mandate as technology disseminator and is unable to save the poor farmers from the clutch of Input agents.

Successful Interventions by KVK

(A) Farm Mechanisation

Nipania Jat Village, with majority of farmers having more than 5 hectares of cultivable land, is an example of farm mechanization for high yield, elimination of drudgery, and minimum usage of manual labour. The KVK has demonstrated all the farming equipments to the farmers and facilitated with banks for purchase of tractors and other agricultural machinery. The KVK is successfully roping in various farmers to utilize the farming equipments for ploughing, seedling, spraying of fertilizers and pesticides, post-harvest processing etc. As a result, the seasonal labour problem was solved, and they could distribute input resources optimally. In addition, famers owning farm equipments are giving these equipments on hire to other small landholding farmers in the neighbouring villages. Mechanisation of farming and post-harvest processes impacted the farmers with high income generation in the villages.

(B) Organic Farming

Mr. Dasharath Singh, a 50 years old farmer from Bagrouda Village of Morar Block possesses 4 hectares of cultivable land. He is practicing organic farming by avoiding use of chemical fertilizers in his field. Mr. Singh has adopted an innovative method of cultivation of paddy. He is using green manure in collaboration with Indian farmers Fertiliser Cooperative Limited (IIFCO) and enriching his farm field with biological nutrients and micro organisms. This resulted in high yield and high income with low input costs.

(C) Income Contribution by Women folks

With the active support and guidance from SMS, Home Science, groups of women in villages were provided training in making and marketing of soya paneer and soya namkeen. Soya cultivation is significantly high in Bhopal district; marketing of soya based products is supplementing the incomes of the village households. Mrs. Asha Devi, (25 years) from Bagrouda village was mobilizing womenfolks of the village and making soya milk paneer and other

derivates from soya. Due to high nutrient content, there is a good demand for such products in Bhopal city.

Recommendations

- Custom hiring of agricultural machinery/equipment has to be strengthened in each block as medium and small farmers are unable to hire the equipment from private vendors who are charging exorbitantly on hourly basis for all the machinery.
- In the case of crop loss due to natural calamities, revenue officials are assessing the loss without the involvement of agricultural experts. Farmers are of the view that KVK should be roped in such assessments of crop loss as KVK has such expertise to gauge the loss of crops. This will help in getting legitimate compensation for the crop loss on rational assessment.

- Farmers are of the opinion that KVK should strengthen its infrastructure to supply high-quality seeds to all the needy farmers and not to select farmers as is the practice. Private players (input dealers) are running a network up to the village level whereby they impose low-quality seeds, ineffective fertilizers, pesticides on farmers. Farmers are of the opinion that all the input materials have to be assessed by KVK before any private vendor markets such material in the villages.

- There should be separate Minimum Support Price (MSP) for different regions of the state as the environmental and geographical conditions such as weather, rainfall, fertility of the soil, cost of irrigation etc. are different in different regions.

7 KVK, Chhindwara

Chhindwara district is spread over 11,815 sq. km of area most of which is hilly. The population consists of tribes. Average rainfall is 1,183 mm. Population of the district is 20 lakhs as per Census 2011. It has plenty of mineral wealth like coal, manganese, dolomite etc. Forest cover of the district is more than 35 percent of the total area and forest wealth includes bamboo, teak, Harra, tendu patta etc. Major crops of the district are wheat, orange, pomegranate, papaya. The district has 1,996 villages and KVK has so far covered 400 villages.

KVK Chhindwara was established in 1983 and functions under the administrative control of Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur. This KVK is manned by two SMS – one Soil Science Specialist who has been given charge of PC, and one Agricultural Engineering Specialist – and 3 technical staff. Budget expenditure during 2013-14 was Rs. 61.4 lakhs.

KVK Chhindwara has variety of farm equipments for demonstration such as rotavator, seed drill, cultivator, plough, ridge and furrow machine, SRI (system rice intensity) liner, rota weeder, ped type dry land weeder, twin wheel hoe, etc.

Coverage & Outreach

During the year 2013-14, the KVK has covered 5 blocks and 11 villages with an outreach of 6,000 farmers. For the past 5 years, outreach in the blocks and villages has gradually increased by 50 percent.

Testing of different types of wheat varieties at KVK Nursery against Natural Calamities (Left side – weather resistant variety-GW:322, Right side – crop vulnerable to untimely weather-GW:366)

The photograph shows the demonstration of two varieties of wheat, one is weather resistant (left side – GW:322), while the other one on the right side is susceptible to weather changes (GW:366).

Besides the mandated activities, KVK is producing and supplying seeds and planting materials to farmers. In this sense it works as a resource centre. It has distributed nearly 200 quintals of seeds and more than 6.5 lakhs of planting materials to the farmers.

Details of Technologies Transferred

Notable among the technologies transferred are:

(i) Horticulture – hi-tech vegetables, pomegranate, papaya, meadow orchards of guava
(ii) Agricultural engineering – drip irrigation, rota weeder for SRI, mole drainage etc.

One of the interventions made by KVK in technology transfer is in poultry. A particular poultry chicken (Kadaknath chicks) popular in Jhabua is brought here and farmers were encouraged to rear these chicks. The KVK is managing its own poultry in its premises for training and demonstration purpose.

Success Stories

(A) Fruit Cultivation in Arid Lands

Under the guidance of KVK Mr. Tonpe, a farmer with 25 acres of barren land, is cultivating pomegranate and papaya, and is earning more than Rs. 50 lakhs per annum. The KVK has provided technology in agronomy, plant protection, drip-irrigation etc. and is continuously monitoring the cultivation. Mr. Tonpe has got several awards at national and state level. His farm activities have been covered extensively by print and electronic media, that has motivated other farmers as well.

(B) Poultry as a Regular Income Generator

Another success story is of 25 years old Mr. Rinku Pal, a poultry farmer of Gadri Dhana, Khajri Block, who started poultry farm by investing Rs. 5,000/- with the technical support and chicks supply from KVK. Now, Mr. Pal is running a poultry farm of the capacity of 1000 chicks and earning a monthly income of Rs. 20,000/-. He has also given training to small and marginal farmers in other villages of Chhindwara to set up such poultry units. With the technical support from KVK, farmers in several villages are provided with consistent and regular income by supplying chicken to nearby towns and neighbouring villages. This is a boon to smallholding-farmers in distress farming situations.

Focus Group Discussion with Farmers

Chhindwara dominated by tribal population has a peculiar problem of adoption of modern farming technology. Majority of the villages are dominated by tribal population, and are lying in the hilly, rough, dry-land terrain where technology is not implementable.

In these villages, tribal lands have their own merits, such as unpolluted soil, green, natural environment. To enable the tribal farmers to rip the benefit of these natural advantages the KVK is adopting a strategy of advocating organic farming. The organic produce such as vegetables, pulses, cereals etc. are taken to the nearby towns (block, Taluk headquarters), and district headquarters by the farmers. However, due to low per-capita income of the town people, farmers are not getting reasonable price for their organic produce. The problem intensifies due to high transportation cost of these produce to the towns and district headquarters. Farmers wanted the Government agencies to help them to market their produce in cities and towns by arranging for procurement at their village fields. Farmers in these villages have to spend a lot of money to take their produce to the towns which are nearly 100 km from their hilly habitation, thereby spending lot of money on transportation of vegetables, pulses, cereals etc.

Farmers are also of the opinion that, due to their illiteracy, some people are misguiding and cheating them with false documents. They are not provided with genuine information about farm loans, subsidies etc. KVK should take up this responsibility and make them aware of about all these issues.

Villagers are also of the opinion that there should be some self-employment avenues for the youth of the villages so that there is a subsistence employment throughout the year for the families with small landholdings. It is pertinent to mention here that in the remote villages, KVK has encouraged youth for self-employment by collecting, packaging, and marketing of honey, *dalia* etc. Such a unit has been established with the support of KVK and in collaboration with a local NGO (Nageshwara Charitable Trust – Devoted to women and rural development). This unit is providing wage employment to 10 women of Jamuria village

A small enterprise in value addition in Jamuria village of Tamia Block

Major Recommendations

- Chhindwara dominated by tribal population has peculiar problem in adoption of modern farming technology. The villages are are lying on the hilly areas in rough, dry-land terrain. These villages have their own merits, such as unpolluted soil, green, natural environment. To bring the tribal farmers into the ambit of these natural advantages, KVK, Chhindwara has to educate farmers to adopt organic farming.
- In certain tribal pockets, though the tribal farmers are practicing organic farming, their produce such as organic vegetables, pulses, cereals etc. are not fetching them legitimate price due to non-affordability of these produce by local population. The KVK should facilitate the transportation of such organic produce to district headquarters and nearby towns/cities where there is a demand for such produce. Alternatively, KVK should arrange organic melas in villages where organic produce can be kept for display and consumers from cities can visit and purchase the organic

goods. This will mitigate the problems of transportation of goods by farmers to far-off cities. Villagers are of unilateral opinion that Government should strengthen KVK to arrange "Organic Melas" in village clusters at least once in a month.

- Most of the tribal farmers are illiterate and have poor exposure to rules and regulations. They want KVK to help them, conduct orientation classes to educate them and explain Government rules, subsidies, loans, and other facilities provided by banks so that they take correct and timely step.
- Villagers are also of the opinion that there should be some self-employment avenues targeting the youth of the villages so that there is a subsistence employment throughout the year for the families having small landholdings. They want KVK to conduct classes for youth of the villages to collect and market forest-based produce during lean seasons.
- The KVK has taken initiative in promoting poultry in few villages by bringing in "Kadaknath Chicks" from other areas. In those villages, poultry business is fetching regular income to the farmers. The KVK should identify poor farmers in every village, and train them for poultry business which ensures regular income in distress conditions.
- KVK has successfully demonstrated fruit cultivation in arid lands of Chhindwara. They should focus to extend the area of cultivation in every village so that fruits such as pomegranate, orange, banana can be cultivated in every village.

8 KVK, Gwalior

Total population of the district is 20.3 lakhs with 2 lakh households. Total area is 5,214 sq.km. Out of this, 25 per cent is forest area, 50 per cent is the net sown area, and the net irrigated area is 912 sq. km. Major crops are soybean, wheat, maize, chilli, onion, tomotos etc.
KVK, Gwalior was established in the year 1999 and is functioning under the administrative control of Raja Mata Vijaya Raje Scindia State Agriculture University. Priority areas of the KVK are Agriculture, Horticulture among others. All the sanctioned posts of SMS and technical support staff are filled. Annual expenditure for the year 2013-14 is Rs. 85.5 lakhs. The KVK has infrastructure like Farmers' Hostel, Staff Quarters, Library, Agricultural Machinery, Crop Cafeteria, Soil testing laboratory etc. Total villages in the district are 666 out of which KVK has so far covered 138 villages.

Outreach of the KVK, Gwalior (Activities of KVK) for the past 5 years

During the past 5 years, KVK has covered 11 blocks and 30 villages, and directly benefitting 22,000 farmers cumulatively. The KVK is imparting wide range of training, demonstrations such as FLD, OFT, Farmers' Training – focusing on specific crops, seasons, technology dissemination, awareness programmes apart from production and supply of seeds and

planting materials. Besides, the KVK has conducted 192 training programmes for farmers in the premises of KVK.

Technologies transferred during the last 5 years

The KVK is acting as an implementing agency and an interface between farmers, research agencies and universities. Technologies developed by these research agencies in the areas of HYV+seeds, nutrient management, seed treatment, culture, SRI of paddy etc. are being transfered by KVK through field trials, demonstrations, training etc.

New variety of Chilly cultivation through poly mulching

Poly-House for production of high yield seeds

FGD with Farmers (Gwalior)

1. **Farmers' Expectations vis-a-vis KVK Scientists' Contribution & Use of Technologies**
   The KVK has been able to supply high-quality seeds only to select farmers for demonstration of technologies. All farmers are thus depending on Input Dealers for quality seeds who are charging exorbitant price for seeds. Therefore, farmers want KVK to supply seeds.

2. **Problems in Transfer of Technologies**
   Farmers are depending on Input Agents due to their strong network. These input agents are providing seeds, fertilisers and pesticides etc. on credit basis to farmers and counselling them on farming methods, which attract them to buy more and more input ingredients from Input Agents. KVKs with their limited role as technology disseminators are facing financial and other resource crunch and are unable to meet the demands of the farmers and thereby not being able to win their trust.
3. **Opinions of Farmers on Productivity, Entrepreneurship, and Impact on Women**
   Farmers opined that KVK technology leads to more yield, enhanced income, and promotes entrepreneurship among youth. Womenfolk are also benefitted from the

extension services of KVK but marketing is a problem. Also, with high yields the prices go down.

4. **Other Issues**

Farmers are of the opinion that seed distribution has to be expanded by KVK to all the villages especially to small farmers. On this point, the KVK has expressed its inability citing human & financial resource crunch. Farmers are not encouraged towards organic farming to avoid high input costs, and to adopt sustainable farming practices. On this point, the KVK clarified that many farmers are claiming to have adopted organic farming methods, but on site inspection and verification found that these claims were not correct. It was revealed that some farmers are claiming organic farming for want of prize money awarded by the state, central Governments.

Success Stories

(A) Showcasing Integrated Farming: A Model at Micro-level

Mr. Ramesh Singh Rajawat, (30 years) from Badraouli of Morar Block is a farmer with 2 hectares of cultivable land. He has adopted diversified agriculture by cultivating wheat, vegetables, guava in his farm land besides having 2 cows. He has his dwelling unit also in one corner of the farm where he has installed *gobar* gas plant and is getting free fuel for all his domestic needs. In addition, he is using *gobar* as a bio-fertilizer in his field.

By all these means, his regular daily income rose to Rs. 200/- as compared to previous distress & seasonal farming that did not guarantee any regular assured income.

(B) Dairy Farming: Rich Dividends to the Investment

Mr. Govind Singh Rana (40 years) from Udayapur (Morar Block), a medium-land owner, has 5 hectares of cultivable land with reasonable resources to diversify the farming activities. Five years ago, Mr. Govind has invested in one buffalo and now owns 20 buffalos of high mulching quality. Shear hard work, involvement of all family members and reinvesting the income by milk selling, he now has a dairy business fetching him a daily income of Rs. 6,000/- by supplying 150 litres of milk directly to consumers in Gwalior city.

The KVK has played a crucial role by sending Mr. Govind Rana to Haryana for training in rearing of buffalos and helping him in marketing the milk directly to consumers in Gwalior city.

9 KVK, Hoshangabad

Hoshangabad's geographical area is 5,408 sq. km out of which 2,229 sq. km is covered by forest. Total populated villages are 952 with a total population of 12.4 lakhs. Net sown area is 2.9 lakhs ha, double cropped area is 1.8 lakh ha, and net irrigated area is 2.27 lakh ha. The entire district has black soil. As the district is situated on the banks of Narmada River, almost 90

percent of its irrigation is through canal. Major crops are wheat, rice, soybean, maize, garlic, chilli etc.

KVK, Hoshangabad was established in the year 2004 and is under the administrative control of State Agriculture University, Jawaharlal Nehru Krishi Vishwa Vidyalaya (SAU, JNKVV). The KVK office is located in Powarkheda village which is 8 km from Hoshangabad town. The office and nursery of the KVK campus is spread across 50 acres of farm land located in the main campus of Zonal Agricultural Research Centre (ZARC) of the Department of Agriculture of Madhya Pradesh Government. Main domain of the KVK is in Agriculture followed by Horticulture. Out of the 6 sanctioned SMS posts, 2 are vacant. In addition, there is 3 technical support staff. During the financial year 2013-14, Rs. 44.67 lakhs was the expenditure incurred by the KVK.

During the preceding year 2013-14, the KVK has covered 6 blocks with 34 villages in the district. Total number of farmers benefitted directly by the KVK's training programme is approximately 750. During the last 5 years, the outreach of KVK has spread over in all the blocks. KVK has covered 427 villages out of 952 villages in the District through its various activities. It has reached out to a number of farmers through TV/Radio Talks, Farmers' fair, and also worked as Resource Centre for many domain functions.

Meeting with farmers at KVK, Powarkheda

Some Details of Technology Transfer to Farmers during the past 5 years

Some of the technologies transferred during last five years are (i) high yielding scented variety of PS-3 paddy, (ii) high yielding multiple resistant variety of JS-97-52 of soybean, (iii) value addition of fruits and vegetables, (iv) High yielding variety of late sown variety of MP-1202 of wheat, (v) IPNM and STV on wheat and tomato, and (vi) HY late sown variety of JG 14

of Gram. With these technological interventions, more than 1,000 farmers have been benefitted in several villages. These technologies were further propagated by the farmers to their neighbouring farmers and villages.

Focus Group Discussion

Impact of the Technology – Feedback from Farmers

Feedback from farmers shows that technology transfer has an impact on the incomes of the farmers – yield of crop has increased, sometimes by 3 times in cases of pulses and cereals. Cost of cultivation has come down significantly due to use of technology. Pest resistant seeds, high yielding seeds contributed to high income of the farmers.

Accessibility of KVK to far-off villages – Demand for an Extension Centre of KVK

Some of the farmers who came from far-off villages stated that KVK's resources and expertise is better utilized only by those farmers whose farm lands are falling in close range of the office of KVK. Other villagers who are in the outer periphery of the district are finding it difficult to visit KVK for consultation, and neither the KVK is able to provide various services in these villages. The farmers staying far away from this KVK are demanding for another KVK near their villages, or at least an extension centre of KVK to cater to their needs. However, the KVK has cited that the farmers hailing from peripheral villages are taking help from the KVK of adjoining district which is nearer and easy to approach.

Impact on Women Farmers

KVK, Hoshangabad has given training in growing of Garlic G-282 variety targeting women farmers. Income of women farmers increased up to 40 percent due to this intervention. Use of Maize Sheller for shelling of Maize cobs also contributed to rise of income among women up to 65 percent. Besides, women are also given training for mushroom cultivation. This has also been fetching constant income during lean seasons.

The KVK is also providing training for Azola cultivation (high protein feed used for cattle and poultry), and napier grass cultivation which is used as fodder for cattle. The KVK has trained farmers in organic cultivation of fruits, vegetables.

Organic farming in Ghatli village

Animal husbandry in Bamuriya

The KVK has also conducted training programmes on entrepreneurship development such as seed production, stitching & tailoring, vermi-composting, soya processing.

Success stories of KVK

(A) Organic Farming

Shri Roop Singh Rajput, a young and energetic farmer of Rohana village of Hoshangabad (Block & District) has started vermi-composting and cultivation of organic based vegetables in the year 2009 with the technology assistance from KVK. He used organic matter in cultivation of rice, wheat, summer moong, vegetables etc.

In the last five years he has gained a net profit of Rs. 3 lakhs per annum in a 3-acre land through organic farming. During this period he purchased two cows, one buffalo, two bullocks and one acre land. He is also selling vermi-compost in different farmer fairs, local market and to the neighbouring farmers. He is in the process of getting a license for organic production.
After the success of Mr. Roop Singh, more than 10 farmers of his villages started organic production of crops.

(B) Poly-mulching: Successful approach to achieve high yield of vegetables

Dharamdas Kushwah , village- semari harchand

Before contacting the KVK in the year 2012, Mr. Dharamdas used to cultivate vegetables through traditional methods. With the influence of KVK he was exposed to the new technology of cultivation of vegetables, i.e. Poly-mulching. He started cultivation of chilli, tomato and brinjal through poly-mulching. He used drip irrigation and fertigation in the integrated nutrient management and integrated pest management. During this period he has been guided by the KVK scientists through visits and mobile phone. During cultivation of tomato, he applied staking practice also. Following staking & mulching practice he earned Rs. 75,500 per annum with an expenditure of Rs. 16,800 per year and is getting net profit of Rs. 58,700 per year.

Half a dozen farmers started cultivation through drip and poly-mulching technology after seeing the success of Mr. Dharamdas.

(C) Bumper wheat production

District Hoshangabad is located under central Narmada Valley Zone. The district is blessed with full bowl of natural resources especially highly productive heavy black soil with good sources of irrigation and favourable agro-climatic conditions for crop production. The predominant cropping system of the district is Soybean-Wheat. During the Rabi season wheat covers more than 75 percent of the net sown area of the district.

Since the inception of KVK, farmers have been motivated for improved technologies of crop production with field demonstration at farmers' fields with high-yielding new varieties accompanied by improved crop production technologies like (i) sowing, (ii) use of balanced fertilizers, (iii) row spacing, (iv) integrated weed management, (v) new high yielding varieties. All these techniques have transformed the lives of farmers in the district. With the introduction of new varieties of seeds (GW 273, GW 322, MP 1142, MP 1106, MP 1201, MP 1202 etc.), coupled with new technologies of KVK, wheat productivity per ha of Hoshangabad District has increased from 18 qt to 44 qt/ha, which is now at par with that of Punjab and Haryana state.

(D) Dairy as a Successful Venture – Showcasing of KVK Technology in Animal Husbandry

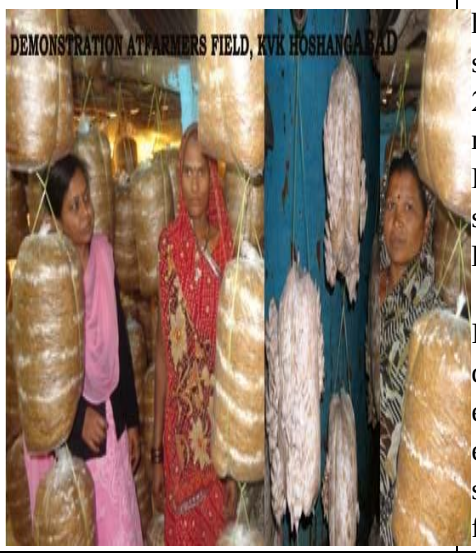
Shri Virendra Singh Rajput, native of Bahmuriya village is an innovative fermer. He has 2.75 acres of agricultural land and is growing crops like cereals, pulses, vegetables and oilseeds. In the year 1992 he started rearing milch animals traditionally with two cows with an intention of developing dairy as a business. He is regularly in touch with KVK scientists for innovative practices in agriculture which can be adopted to enhance income generation.

With the motivation and technical support from the KVK scientists he started to develop dairy as a business for income generation. He decided to go for rearing of milch cattles of improved breeds and he had purchased two cows of Holstein Freezeoun and one buffalo of Murra breed. At the beginning, he invested Rs. 48,000/- on purchase of improved breeds cattle and Rs. 10,000/- for making temporary shed (shade) for cattle. At present, he owns 20 cows of improved breed with total dairy production of 100 liters/day.

He earns an income of Rs. 5 lakhs per annum by selling milk after deducting all the expenses such as fodder, wages etc. In addition, he is also selling 12 calves every year fetching him Rs. 60,000/- @ Rs. 5,000 per calf. With further intervention of KVK and with their technologies, Mr. Singh has established a bio-gas plant and is producing 60 to 70 trolley of bio-gas slurry which is fetching him Rs. 80,000 per year.

Empowering Tribal Women through Mushroom Cultivation:
Impact of KVKs Technology on Income Generation

Success Story



Mrs Sheela Dhurve, a tribal woman and a resource-poor farmer, having only 1 acre agricultural land in Pandukhedi village was struggling for subsistence income for many years. In the year 2012, with KVK's focus on enhancing the income level of marginalised farmers, she came in contact with KVK. As part of KVK's Off-campus training programme to village farm women, she was trained in mushroom production in a small piece of waste land in the backyards of her dwelling unit.

In the year 2013, Mushroom production technology was demonstrated by the KVK in Pandukhedi village. Mrs. Sheela is earning an income of Rs. 10,000/- after deducting all the expenses. Other women were emulating her success story and started mushroom cultivation with the guidance and technology from KVK. This has enhanced the quality of life of rural tribes.

(F) Resource Conservation Technology: Zero Tillage Cultivation of Green Gram

After the harvesting of wheat, lot of crop residue is left in field. Burning of residue after the harvest of wheat crop is a common practice. It adversely affects natural flora and micro-organisms leading to nutrient loss and degradation of soil properties. After the harvesting of wheat crop with combine harvester, the field was once rotated with rotavater without residue burning in the field. Green gram variety PDM 139 was sown using seed drill in a dry condition & field was irrigated for germination.

District Hoshangabad was completely fallow during the summer season after the harvest of Rabi crops. With the technological interventions by KVK, coupled with availability of New High yielding pest & disease resistant varieties, improved cultivation practices, integrated pest & disease management etc. acreage of Green Gram increases significantly. Presently, it has reached Zero Tillage Cultivation of Green Gram.

Major Recommendations

- Farmers are demanding more varieties of pest-resistant and high-yielding seeds to reduce the cost of farming and increase the yield. They are expecting KVK to develop more such seeds as use of pesticides is proved to be detrimental to the soil.
- KVKs are located either in the district headquarters or in a village abutting the outer peripheral boundaries of the district. So, the farmers from the other end of the district are finding it difficult to travel more than 100 km distance to consult the KVK. Neither the KVK is able to conduct training programmes such as OFT, FLD etc. in those villages. Therefore, farmers are demanding extension centre of KVK near their villages in order to access the expertise of KVK. This is the demand of all the districts.
- Some experiments such as training of women in Garlic G-282 and mushroom cultivation should be expanded to every block and many more villages. In every village, at least couple of women farmers should be trained in such income generating activities. This is a safety net for womenfolk with regular income during lean seasons.

10 KVK, Ratlam

Total area of Ratlam is 4,861 sq. km which is 1.11 percent of the total area of Madhya Pradesh. For the administrative convenience, Ratlam is divided into 6 blocks. Population of the district is 14.55 lakhs (as per 2011 census). Important crops of the district are wheat, jowar, maize (grain crops), chana, urad (pulses), soybean, groundnut (tilhan).

KVK Ratlam is located in Kakukheda village of Jaora tehsil, 50 km away from Ratlam headquarters. It was established in 1996 and run by Shiksha Samiti Kalukheda, an NGO devoted

to the up-liftment of poor people in general, and village farmers in particular. Main functions of this KVK are in the area of agriculture, horticulture, and veterinary. Out of the sanctioned posts of 6 SMS, 2 are vacant, and all the 3 technical staff are working in this KVK. Budget expenditure for the financial year 2013-14 is Rs. 80 lakhs.

The KVK is fully equipped with the infrastructure, with a campus of 15 acres with varieties of crops/seeds for demonstration. The campus is having residential quarters for all the SMS and technical staff. It has farmers' hostel, soil testing laboratory, farm equipment for demonstration and training purposes. KVK Ratlam has covered 485 villages out of the total villages of 1,056 in the district. In addition to the mandated activities, the KVK has participated in TV/Radio talks, soil health camps, SHG meetings, Kisan melas, Kisan goshtis, diagnostic visits etc.

Technology Transfer to Farmers during the past 5 years

Some of the details of the technologies transferred are: (i) Varietal replacement of Soybean –JS-9560, (ii) Wheat-JW-1142, (iii) Onion-AFLR, (iv) INM Cotton, (v) IPM Soybean, (vi) LPM –Balanced ration with mineral & vitamin supplement, (vii) Pregnant Animal Management.

Impact of these technologies is felt on many counts such as (i) high yielding, (ii) short duration, (iii) low input costs etc.

KVK Extension Model: Farmers to Farmers

KVKs are adopting dissemination of technology through 'farmers to farmers' model.

1. At district level the KVK acts as technological hub and provides latest and innovative technology to the active farmers of the district.

2. Farmers take keen interest and participate in all the activities of transfer of technology (training, OFT, FLDs, Vocational training etc.)

3. In the above activities farmers acquire knowledge of the specific technology and by using such skills & technology repeatedly farmers become expert.

4. This Expert Farmer becomes a "Resource Farmer" at block as well as village level for dissemination of that technology & skill to other farmers under the guidance of the KVK.

5. At village level other farmers who couldn't approach KVK (or whom KVK couldn't reach out) will be empowered with knowledge, skills and technology through the Resource Farmer to adopt at field level to enhance productivity, yield and income.

This model is helping out the farmers who are not able to attend the activities of KVK.

Focus Group Discussion with Farmers

- Farmers want that KVK should work as resource centre for providing inputs.
  KVK is creating entrepreneurs in the domain of motor-winding, tractor maintenance/repair etc. However, in the case of creating avenues for women, the KVK could not make its mark. Soybean being the main crop, there are several bi-products of soya, such as soya milk, soya milk paneer which are high in protein. The KVK with the help of its team of home Scientists can create opportunities for rural women in such areas. The KVK can also act as facilitators between urban consumers and rural producers of such high protein products, thus creating a market for such products.

- Sensitization of women is also needed for getting training, and earning.

Success Stories

A. Grape Growers to Vinery

Mr. Patidar hailing from a traditional farming family has been cultivating different crops like Pea, Tomato, Chilli and Grapes. With technical guidance from KVK, Mr. Patidar has expanded vinery grape cultivation from 2 acre to 10 acres.

B. Enhancing income by onion cultivation

Mr. Radhe Shyam, Village Bhimakhedi, post Jaora, District Ratlam is having 5 ha of land. After repeated failure and recurring losses in cultivation, he started onion bulb cultivation by using improved variety CVAFLR with proper management during kharif and rabi season under guidance of KVK. The intervention of KVK was varietal replacement of onion crop without changing cropping system during rabi season. Now, he is earning a net income of Rs. 1.2 lakhs.

Major Recommendations

- Ratlam is adopting a novel model of ‘farmers to farmers’ for dissemination of technology. Through this model the KVK selects active and innovative farmers of the district and trains them in all the latest processes. They become the resource persons, and in turn, train few farmers in each village. These farmers become resource farmers of the village and in continuous collaboration with KVK and innovative farmers, train the farmers in their respective villages. This model is successful in Ratlam, and it can

be emulated in other districts as well due to resource constraints of KVKs of all the districts.

- There are many farmers falling under the category of control group who attended the FGD, and they are of the view that, they can increase their yield, income if KVK provides them training in latest farming methods, latest seeds etc. There are many farmers holding the land in the range of 5-10 ha and willing to invest in agriculture, but there is no expertise available to them. The KVKs have to identify and reach out to such farmers.

- There is a common problem in all the districts, that is, inability of KVK to supply quality seeds to all the farmers. By and large, the farmers are falling into the trap of input agents who are supplying low quality seeds, unwanted and unnecessary fertilizers, pesticides etc. to the farmers without any certification from KVK. Farmers are demanding that KVK should certify the genuineness, authenticity and necessity of such inputs in order to help them, and to prevent them from exploitation by the dealers. The KVK has to be strengthened with infrastructure and human resources to expand the farmer-base for supply of seeds in each and every village.

- The KVK has to make its mark in Home Science related activities. There is a sanctioned post of SMS (Home Science) but not posted. KVK also has to device training programmes tailored to the needs of women in areas such as horticulture, poultry, mushroom culture etc. The KVK has not fully utilized its expertise towards women empowerment through self-employment avenues.

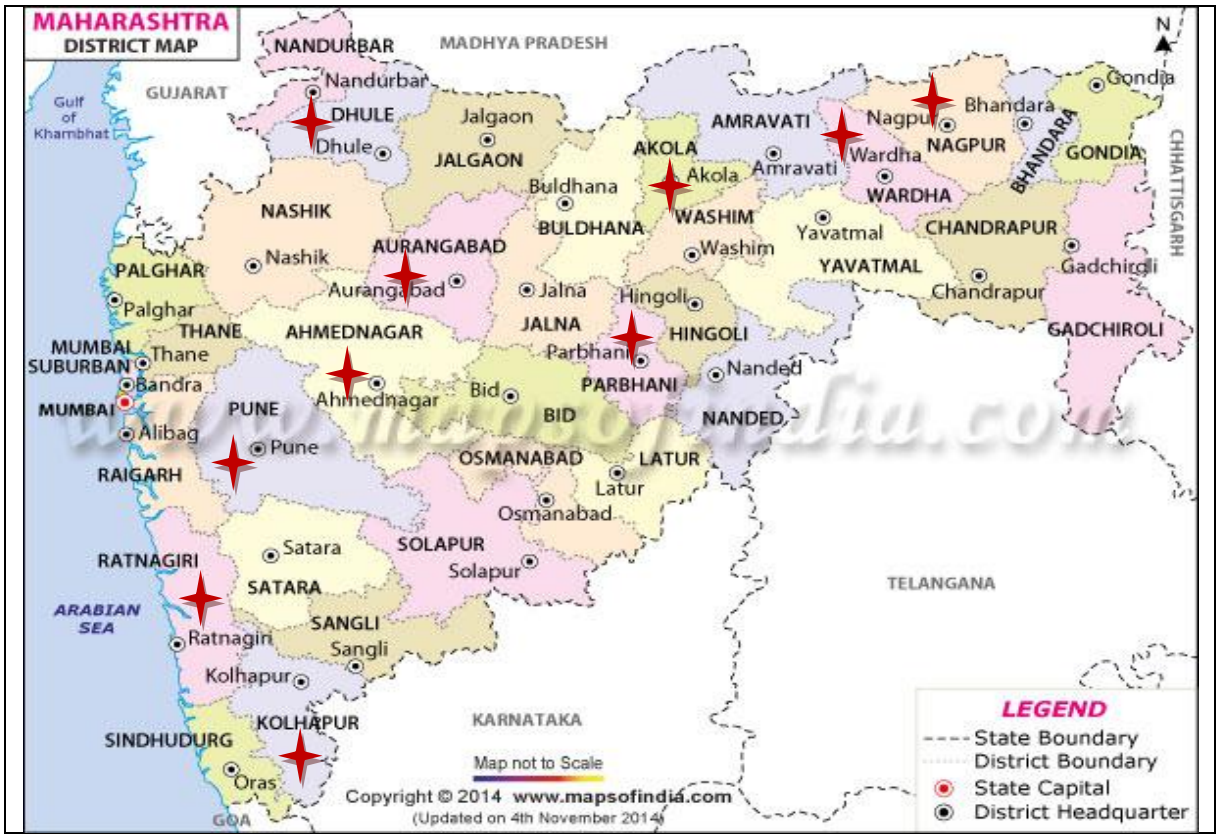
- The KVK also needs to focus and devise programmes for youth of the district such as coordinating with financial institutions, training on self-employment avenues to impart skills to youth to make them self-employed.

Maharashtra

Although Maharashtra is a highly industrialized state of India, agriculture continues to be the main occupation in the state. It is the third largest state in the country with an area of 307,713 Sqkm with 17 percent

forest cover. It is bordered by three major states Andhra Pradesh, Karnataka and Gujarat and the Arabian Sea is located on west coast of Maharashtra. Marathis comprise the majority of population. The state is organized into seven divisions i.e. Amaravati, Aurangabad, Nanded, Konkan, Nagpur, Nasik, and Pune which are further divided into 36 districts.

The dominant Physical trait of the state is its Plateau Character The state enjoys a tropical monsoon climate. The seasonal rains are very heavy and the rainfall is over 400 cm but the rainfall diminishes to a meager 70cm in the Western Plateau districts with Solapur –Ahmednagar lying in the heart of dry-zone. Southwest Monsoon is critical for the farmers as most of the cultivable land is rain-fed. 16% of the net sown area is irrigated and 55% irrigable water is from 'Wells'. Main crops grown are rice, jwari, Bajri, wheat and pulses. The main cash crops grown in the state are cotton, sugarcane, turmeric and oilseeds like groundnut, Sunflower, soybean and vegetables. Climatic conditions are conducive for cultivation of mangoes, bananas, grapes and oranges.



There are 44 Krishi Vigyan Kendras (KVK) in the state. Out of which 1 is under ICAR, 26 are governed by Non-Governamental Organisations (NGO) and 16 by state universities. Out of these 44 KVKs, 10 KVKs have been selected for the present study on random selection basis. The selected districts have been indicated in the above map by red star.

Various teams visited about 8 KVKs out of ten in person located in Pune (Baramati), Ahmednager (Bableshwer), Aurangabad (Gangdali), Kolhapur, Ratnagiri, Nagpur, Wardha and Akola and had discussions with programme coordinators SMS and, other staff. Interactions were also convened with farmers from various villages. Focus group discussions were organized at various levels with stakeholders in KVKs as well as in various villages, state departments and university departments.

Team visited a number of villages to have ground level experience of change that is taking place due to the technical interventions provided by KVKs. Farmers from various villages were invited in KVKs for focus group discussions. District wise reports are indicated below:

1. KVK, Bableshwar, Ahmednagar

The KVK Babhaleshwar is functioning under Pravara Institute of Research and Education in Natural and Social Science (PIRENS), which is an NGO. The district has 7 blocks and 782 villages under its operational area. Till now, 324 villages are covered and a total of 81521farmers have benefited by various activities of KVK.

KVK operations and Challenges:

The KVK Bableshwar has good visibility due to its interventions. However the major constraints that the KVK experience are the farmers' demand for more advanced technology and smart equipments for drudgery reduction and other problems. The KVK which is sanctioning under NGOhas to purchase technology at the same cost as is given to private players. Similarly approved technology is not available on domain. Initially the farmers demand was only for technology and now they demand for services, advisory and consultation also. During the discussions it was brought to the notice that KVKs under NGOs do not get full support. ICAR should treat KVK associated with NGOs at par with KVKs under universities and state departments in terms of providing technology and training to SMS, The Band width for radio service provided to KVK is not sufficient to cover farmers in distant villages as the present band width covers only 30 km and therefore its programmes have limited outreach. The area under this KVK is drought prone and farmers generally depend upon animal husbandry and dairy related activities. To provide timely advice in case of diseases to animals, villagers are dependent on district veterinary Doctors. It has been observed that the villagers trust the advice given by KVK but the KVK has no facilities to provide advice on veterinary issues as SMS veterinary is

not posted here. The KVK, is providing short as well as long duration (minimum 3 days maximum 2 months) training to farmers in entrepreneurship. In-house training for creating young Entrepreneurs in the areas like Agriclinics & Agribusiness Training, Refresher Training for Agripreneurs, Beauty therapy, Advanced Tailoring etc. is also provided.

The Ahmednagar District lies in the scarcity Zone. The farmers have little option but to grow only rain fed crops like Bajra and Jowar. Realizing the water scarcity, the KVK suggested the farmers in the dry land area to cultivate drumstick as intercrop under crop diversification programme. The KVK purchased high yielding drumstick variety from Coimbatore which has thick pulp and capacity to start bearing at an early stage of six months onwards from the date of plantation and supplied the seeds and seedlings to farmers. Now more than 18600 farmers in this region are cultivating drumstick as intercrop in Mango orchards, Sapota (Chiku) and tamarind to get higher returns. Drumstick cultivation has replaced various low value commodities like Jowar, Bajara, mungbean and horse gram etc. The intervention of Drumstick cultivation proved to be profitable to the farmers and it is being exported to gulf countries also.

Farmers are generally averse to accept new technology as experimenting with methods of farming may cost them dearly. To reach to wider groups, KVK created Innovative Farmers Club involving more than 700 farmers who are willing to adopt new technologies. Besides, it has established 153 farmers clubs involving rural youth and formed 573 SHG involving 102 villages of five tehsils. They have enlisted chief volunteers and gave them Master Farmer training who will in return train the farmers in the club. Through SHG, farm women and landless laborers are reached out and the socio-economic conditions of these have improved.

Interaction with women farmers club in Tambhere village

There are about 782 villages in the district and KVK has covered around 41% villages. The rest have not been covered due to various problems like far off places, lack of vehicle and other means of transportation and inadequate other resources. In the villages that have been

covered till now, various technologies have been transferred such as integrated farming system, integrated nutrient management, sucking pests management, sugarcane production technologies like broad furrow, trash mulching, inter cropping, farm pound with micro irrigation, up-gradation of local poultry and goats, loose housing of dairy, new fodder crops and silage preparation, protective cultivation, farm mechanization and change of the crop spacing , meadow arch for guava plantation, pomegranate cultivation and fertilizer scheduling based on soil plant tissue analysis. Due to the innovative Farmers' Club, KVK has been able to introduce new technologies faster . Seeing the success in the demonstration fields other farmers also adopted these technologies. The KVK distributed 16767 one-day old chicks of improved backyard poultry breeds free of cost to 337 farmers under ATMA scheme. The KVK conducted vocational Agri clinics and Agribusiness training programmes for agri-graduates and diploma holders.

The KVK encouraged youth to bring together their individual Cattle together and start dairy by adopting loose housing method. Three youths Gaurav (civil engineering diploma holder) Deepak (12^{th} pass) and Promod (12^{th} pass) started dairy with 6 cows on the advice of KVK and currently they have 45 cows, producing 200 liters per day. Following this example youths in other villages also formed groups and started dairy, biogas plants and wormy compost units The outputs will be sold to farmers.

Rural youths dairy farm by adopting loose housing method of cattle rearing (Tambhere village)

It has been observed that the KVKs activities are visible in far off places also. Farmers from Aurangabad are also visiting this KVK for training and adopting the technology suggested by SMS. It is also collaborating with NABARD and ATMA in number of activities and extending technology to farmers. During FGDs it has come to light that there are a number of line departments and organisations that provide guidance, seeds, seedlings and one chick free of cost to farmers. For technical guidance farmers rely on KVK. The KVK is providing a common platform for knowledge sharing among various stakeholders through Kisan Melas, exhibitions and other events. The KVK encouraged farmers to form Producers Company and got them registered. Now farmers are doing direct selling of products in the market after taking advice

from KVK about the right price. The KVK is providing link for marketing of products for both women SHG and farmers by organizing Krishi Melas.

Focus group discussion with farmers representing all Tahsils under the work area of KVK Bableshwar

The SMS home science is providing training to female farmers in women centric activities. They are being trained in backyard poultry, goat rearing, papad and pickle making etc. In the Kisan Melas organized by KVK, women sell their products. Women farmers are demanding market advice and links to sell their products and training in marketing management. One women farmer wants to start chalks preparation but wants market links and related advice from KVK. In the Group discussion it was pointed out that KVK takes 10 days to provide soil testing results due to shortage of facilities .Farmers also pointed out about the need for veterinary specialist in KVK. They also expressed the need for Engineer and market advice experts. The KVK is reaching the unreached through its FM Radio. The farmers demanded for increase of band width.

Programmer doing daily briefs on FM radio.

Observations:

1. The presence of KVK Bableshwar can be felt in nook and corner of the agricultural area in the district and percolating effect in other districts also. It enjoys full trust of the farmers in the area.
2. Many farmers expressed that technology transfer should be done before the farmers start Plantation.

3. KVK is conducting only few field visits due to shortage of funds

4. The farmers have to wait for the visit of district veterinary Doctors as the KVK has no Veterinary science SMS

5. The KVK takes lot of time in giving soil testing reports as the infrastructure available is not sufficient to meet the demands of the farmers.

6. Farmers expressed that the private vendors try to sell those varieties of agricultural inputs which are expensive.

7. The KVK gets technology very late and to certain domains the KVKs (NGO) have no access to new technology. By the time they receive, it is already obsolete. The technology is already available to the farmers through market. Some technologies need license to implement which is a very time consuming process

8. Unlike KVKs under SAUs the KVKs under NGOs have to buy technologies.

Recommendations:

1. The ICAR should consider providing technology free of cost to KVKs working under NGO, in the similar manner as it is provided to KVKs under SAUs
2. Training facilities should also be extended to SMS in NGO run KVKs so that the technology can be disseminated.
3. Should consider giving free access to KVKs in 'Cloud network'.
4. Technology inventory should be maintained and approved technology should be on easy domain so that KVKs can access it.
5. ICAR should introduce some scheme to encourage/create women entrepreneurs
6. Increase in the funds allocation for field visits as farmers accept new technology when they see successful farmers
7. KVK Radio range should be increased to reach farmers in the far off places as they cannot come to KVK personally and most of the farmers in remote areas depend on the KVK broadcast.
8. Mobile veterinary clinic is needed
9. Infrastructure for soil testing should be strengthened as there is lot of demand from farmers for soil testing before starting plantation.
10. KVK Babeleshwar has immense visibility. It should be upgraded as resource center which can facilitate farmers to adopt new technology

2. KVK, Baramati, Pune

KVK Baramati is in the Pune district which was established in 1992 with an operational area of seven blocks i.e. Baramati , Indapur, Purandar, Daund, Haveli, Bhor and Velha with about 706 villages and till now it has adopted about 77 villages. However, this KVK has footfall of farmers from far off places in Maharashtra as well as other states like Punjab, Andhra Pradesh, and Gujarat .More than 400 villages are covered through extension activities.

Operations and challenges:

- Some of the villages in tehsils like Bhor &Velha are 100 kms away from KVK. Due to which small & marginal farmers of long distance are unable to take help from KVK and KVK is also not able to visit these places due to limited staff and resources. During FGDs the farmers requested for more number of exposure visits but the KVK is unable to do so due to lack of fund allocation and deduction in overall budget sanction. The KVK is facing challenge of technology transfer to small & marginal farmers especially tribal communities living in far off places as they have a mindset difficult to change. It requires continuous dialogue and demonstration but not becoming possible due to distance. As such they are not willing to adopt new technologies and want to continue traditional farming methods. Another operational problem that the subject experts pointed out is, the farmers' expectations from the KVKs for supply of seeds and fertilizers as they trust the quality of the products that the KVK provides. But KVK as per their mandate cannot sell these things without license and it is difficult to get license from Central Insecticide Board, Faridabad. So it is essential that procedures for issuing license should be made easy to KVK as the products prepared and sold by KVK are non profit making. This issue has to be looked into at policy level.

- KVK Baramati through its horticulture nursery started supplying quality grafts for the diversification of the cropping pattern and for dry land horticulture. Similarly to reduce both mortality and cost of cultivation KVK introduced single bud sapling method and farmers liked this method and adopted at large scale. Through the soil and water testing lab of KVK, farmers from 25 Tehsils are getting benefitted. KVK is providing modern agriculture implements through its Custom Hiring Center of agriculture implements on minimum rent basis to farmers who are members of the Farmers Club (to encourage cooperative cultivation). The KVK purchased vegetable seedling transplanter from Italy and modified it to furrow transplanting of Sugarcane saplings. The machine is tractor driven and many farmers in the vicinity of KVK are using it. KVK is providing animal care kit, mineral mixture, selling of vaccinated Vanaraj birds to women farmers for backyard poultry.

Modern agriculture implements that are being given to farmers on minimum rent by KVK

- Polythene lined low cost water storage tank technology is a great success as most of this area is rain fed and drought prone. The KVK for dissemination of this technology took farmers to study/exposure visits to different agriculture institutes, research stations and progressive farmer's field. The assured availability of water, not only increased production per acre but farmers could plant more acreage.

- The other interventions of KVK are reclamation of problematic soils by using subsurface drainage and mole plough, introduction of turmeric as a crop diversification crop, low cost hydroponic fodder matting and silage making to provide green fodder in summer season, display board of soil conditions in each village, installation of automated disease forecasting and weather forecasting stations in the villages, area specific mineral mixture based on the mineral content in the fodder, use of bio-fertilizers use of pheromone trap in tomato and use of skirting bags in banana for improving quality.

Skirting bags for improving the quality of Bananas

- The KVK has tested soils of some adopted villages and prepared soil fertility Index board for general characteristics and placed near village panchayat office for ready reference of the farmers in that village.

Farmers watching fertility Index board in Medad village

- KVK is organizing a Rural Carnival called Bhimtadi Yatra in Pune every year to promote the women SHG movement and to give them a big platform for the marketing of the SHG products. More than 400 SHG are participating every year in the festival. However, Women farmers are seeking subject expert availability in KVK for marketing. The KVK introduced contract farming technique through which the KVK is providing marketing linkages. In the contract farming the farmers are provided with seeds by the purchaser (Company that purchases the whole produce). The vegetables are graded in the field and the purchasing company gets it collected from the farm itself.

Women farmers grading and packing ladyfingers in contract farming in Malad village

- In the focus group discussion it was understood that the farmers are no more interested in free services or subsidy. They are demanding more advice, consultancy and quality seeds and technology from KVK. It is observed that the farmers have more trust on KVKs rather than line departments. So KVKs are to be strengthened in terms of subject experts

and plan funds for extension of technology and permit to sell the seeds and organic fertilizers that they have generated in their labs.

KVKs Vocational Training in poly house management is attracting farmers particularly youth. Poly house farming is an alternative new technique in agriculture gaining foothold in Rural India. It reduces dependency on rainfall & makes the optimum use of land and water resources. Poly house farming helps the farmer generate income around the year growing multiple crops. Farmers area have adopted and growing hybrid vegetables, fruits, Roses, carnetia and Gerbera.

Observations:

1. The NGO that hosts the KVK Baramati is a resourceful organization due to which it is able to get latest technology and is also disseminating it to farmers. Its presence can be felt in the entire belt/district either by direct intervention or through percolating impact.

2. In general, the manpower that is sanctioned to each KVK is not proportionate to the area that it has to be covered by KVK. KVK Baramati is managing very well because of the NGO that it is associated with is providing the extra manpower.
3. From the training they receive from the KVK, many farmers became entrepreneurs and are exporting flowers, fruits and vegetables. The study team met such farmers who went to foreign countries several times to attend International Meets.

4. Most of the agri- produce is sent to Pune wholesale market. Baramati farmers have market linkages with traders in Pune with the help of KVK.

5. Cooperative farming is encouraged in Baramati. Farmers with small land holding form a group and borrow technology from KVK and do the cultivation and sell the product to the wholesale purchaser. Due to this the cost of production is less and farmers have assured market.

6. The local newspapers 'Sakal' and 'Agro won' cover success stories in the field of agriculture in the district. This is helping the Maharashtra region in encouraging the farmers to adopt new technology,

Recommendations:

1. Radio programmes relayed from KVK FM services is appreciated by all farmers in Baramati and Bableshwar. The programmes are proving to be very helpful. Certain knowledge sharing is very useful to farmers in other states also. So, a FM dedicated station for farmers' programmes from All India Radio should be considered so that the new technologies adopted by different KVKs in the country can be shared with Farmers all over the country.

2. More farmers are moving towards organic farming as there is demand from consumers for products cultivated through organic farming. There is a need for SMS who can provide technological assistance for organic farming.

3. To encourage more women to start Agribusiness special schemes for women should be considered and more facilities should be provided.

3. KVK, Gandheli, Aurangabad

KVK Gandheli is established in 2011 and is located in Aurangabad district. This KVK has Vaispur, Khultabad, Gangapur and Kannad tehsils under its jurisdiction. There are a total of 682 villages under its operational area. So far the KVK could cover only 6 villages as firstly it was established only two years back and secondly all the villages are more than 40 kms away. The KVK coverage area is a dry zone with low rainfall .Major crops grown in this area are cotton, Maize, Bengal gram and sweet orange.

Discussions with farmers in Vaispur

New varieties of Bengal gram seeds and drip irrigation have been introduced by KVK which increased production and reduced water consumption. Earlier the farmers in these villages were not doing intercrop but after intervention of KVK intercropping is being done. Insect trap technology was introduced for sweet orange cultivation which has reduced loses. Similarly KVK provided Harbara (Bengal gram) seeds to farmers who agreed to experiment. After seeing the demonstration field, fellow farmers also started using KVK recommendations. In the focus group discussion with the farmers it was noted that farmers have been taught to convert sugarcane waste in to kutty, to increase soil fertility. The villagers are having cattle but milk production is low. The veterinary SMS administered de-worming and vaccinated all cattle in the

adopted village which has resulted in increased production. The nearest Govt. veterinary doctors for the villagers are 20-30 km away. In FGD, some villagers expressed unhappiness over the fact that KVK is providing seeds only to some farmers. They expect KVK to provide seeds free of cost and govt. to provide subsidies. The SMS home science formed one women's SHG and persuaded them to start kitchen garden.

The women in SHG want to start some home enterprise but expect govt. to provide basic equipments. The KVK has been organizing off campus one day training programmes as being a newly started KVK it has no hostel facility. The farmers want their soil tested but the KVK has limited soil testing facilities and has no mobile soil testing lab.

Observations:

1. The KVK caters to the needs of small and marginal farmers who are in the far off places also. Resources for the same are not adequate.
2. This KVK's visibility in the district is less as it started two years' back only. Though SMS are available as per the sanctioned strength, the infrastructure is not sufficient.
3. Farmers living in far off places are not able to bring their soil to KVK lab for testing as this KVK is located at far off place. The adopted villages are all most 100 km far off. The infrastructure available for soil testing is also limited.
4. It is difficult to convince small farmers about technology till they see the success. Illiterate farmers are more difficult to impress upon. They can be convinced by showing the demonstration farms. For that, exposure trips needs to be organized especially for the farmers who are living at distant places.
5. The farmers are demanding more advisory services, especially related to marketing of their produce.SMS in respect of marketing and IT is needed in every KVK.
6. Radio programmes relayed from KVK FM services is appreciated by all farmers in Baramati and Bableshwar. The same should start in this KVK also.
7. Veterinary services in this KVK are appreciated by a large number of farmers in the villages. The villagers reported in the FGD that before this KVK started, even for minor surgical interventions, the farmers used to take their animals to nearest Veterinary hospital located at 100 km away from the village. Now SMS of this KVK helps them by providing good treatment.

Recommendations:

1. Along with new technologies, the farmers should be provided with marketing advice, support and training
2. Soil test lab facilities should be strengthened. The need is for soil collection centers in the city and also facilities for mobile soil testing lab.

3. Fund allocation for exposure trips should be increased. Video conferencing facility for each KVK can also be considered to increase the outreach.

4. It is essential to provide one mobile veterinary clinic so that animal related problems can be attended within the village.

4. KVK, Nagpur

Nagpur is one of the major cities of Maharashtra, which has 14 blocks. The total population of the district is 46.0 lakhs and the population density per sq km is 331 persons. The population of Nagpur city itslf is about 27.0 lakh. The literacy rate of the district is 85.0 per cent and sex ratio is 934. The proportion of SC and ST population is 19 and 13 per cent respectively.

Nagpur lies on the Deccan plateau of the Indian Peninsula and has a mean altitude of 310.5 meters above sea level. The underlying rock strata are covered with alluvial deposits resulting from the flood plain of the Kanhan River. The KVK Nagpur falls under dry tropical climate zone which falls under Eastern Vidharba Zone. The temperatures vary from 6.6 to 46.8 degree celcius during various months of the year. The normal rainfall varies from 747 to 1146 mm. The geographical area of the district is 9892 sq. km. The total number of villages is 1874 and about 312 villages are un- inhabited, the number of talukas is 14 and total Panchayat Samities are 13. The total number of villages connected by road are 739, whereas, the number of towns are 29. The number of gram Panchayats in Nagpur district are 778.

KVK infrastructure and Initiation of Farm activities

KVK Nagpur was set up in the year 1994 which is located in the premises of Central Institute of Cotton Research (CICR). The KVK is functioning under the administrative control of ICAR. The Programme Coordinator (an agronomist by profession) who is Principal Scientist at CICR, Nagpur is holding the additional charge of KVK.

Glimpse of KVK office and Lab

The KVK Nagpur is fully equipped so far as the infrastructure facilities are concerned. Since it is functioning within the campus of the CICR, it is getting additional budget for infrastructure and other facilities in each financial year through research projects being undertaken by its scientific staff. Apart from the PC there are five SMS in agronomy, horticulture, extension, veterinary, plant protection and home science. A full time farm manager is also working in the farm of KVK. As mentioned earlier budget and infrastructure has been found adequate.

Agriculture Scenario of the District

The major crops grown in the district are Soybean, cotton, paddy, wheat, jowar, gram, tur and groundnut. The prominent soil concentration in the district is black soil (65%), red (13%), loamy (18%), a very small percentage of sandy and red lateritic soils. The black soil is most suited for the cotton cultivation. The classification of agriculture workers in the district is as follows:

About KVK

During the discussions with officials of KVK, it was mentioned that KVK has done the intervention in almost all blocks covering the majority of the villages through its mandated activities. Front line demonstration and farmers training is being organized in all blocks covering about 3000 farmers. It is further mentioned that KVK has introduced an improved breed of goat among the farmers which was popular across the district and the same is in great demand.

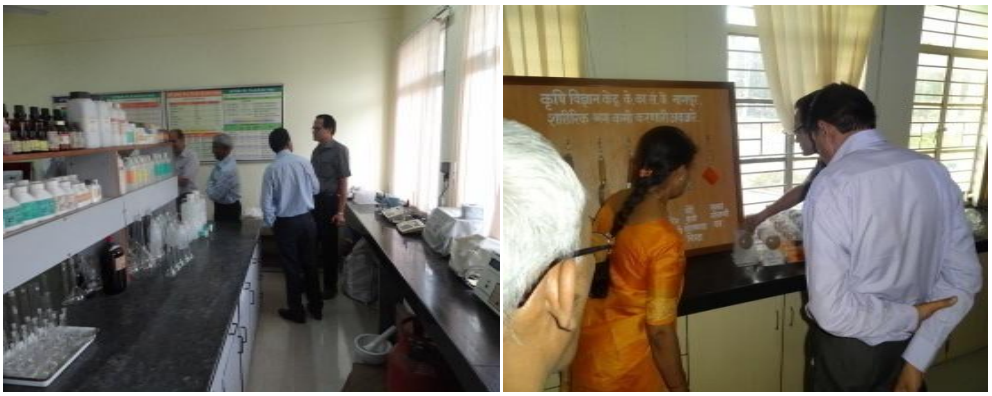
The officials of the KVK have revealed that an awareness programme on cattle diet supplement with mineral mixture was also launched.

Scientists stated that a large number of technologies have been transferred by them to the farmers. The KVK has disseminated the following farm technologies during the recent years which had been successful.

- Weeds management in Citrus,
- High Yield variety in Onion (Akola Safed),
- High Yield variety in Chilly (Tejas),
- Assessment of high density Planting system in cotton,
- Pigeon pea Variety (BSMR 736),
- Pre-harvest drop in citrus. etc

It was mentioned during the interaction with officials of the KVK that more than 100 villages have been selected for intervention by its scientists to initiate FLD &OFT in the selected villages across the district. A large number of farmers have been benefited through its activities. The KVK is also organizing, awareness programmes, producing and supplying seeds and

planting materials. A positive feedback has been received from the farmers. The overall impact of the KVK intervention was disease free seedlings, reduction in cost of cultivation, timely application of nutrients, and proper identification of insects/pests and appropriate management.



Farm activities and laboratory at KVK Nagpur

Strengths and Weaknesses of KVK

Based on the discussions with the officials following points emerged:

- The KVK is rich in infrastructure facilities,
- There are provisions for the scientists to update their professional knowledge,
- The soil testing lab is fully equipped and the laboratory is popular within the district,
- Home science department is generating revenues through its activities particularly patenting the cotton picking bag for female farmers within the district and outside,
- Technical and administrative support staff is not deployed as per sanctioned strength

Success Story: Invention of Cotton Picking Bags by KVK Scientists

Originally the cotton picking bags were invented by HAU, Hissar and MAU,Parbani which is being used by the farmers across the district. The existing bags were having merits and demerits as a result Scientists of home science, KVK Nagpur have introduced certain modification as per the requirements of the female cotton picker; The entire kit was very popular among the female farmers not only in Nagpur district but outside the district. The KVK is also selling these bags and generating the income

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Feedback from Farmers during interaction

During the survey, team has visited in Tirpura, Jhargaon, Thana, Ranmangal, Manori, Pipra villages. During the discussion the following points emerged:

- The average land holding is about 10 ha in the district; agriculture depends upon Monsoon only. Farmers said that there should be continuous flow of information on climate through TV prime channel or through any other modern technique,
- KVK is a knowledge resource centre in the district so far as the agriculture technology is concerned, but due to lack of coordination with the line departments of the state department of agriculture farmers suffer.
- Sericulture is becoming the one of the major commercial crop in certain pockets of the district. The technology has been disseminated by KVK, but marketing is of concern. Farmers are forming the groups and going to Bangalore for selling the raw material. Assistance in marketing or processing of raw material is required to make the technology successful.

Sericulture cultivation is becoming popular in Nagpur district

- It was suggested by the farmers that cropping pattern should be changed according to the climate conditions and KVK has to play the pivotal role in disseminating the information to the farmers in this connection,
- Crop Insurance Policy should be farmer friendly as at present small and marginal farmers are not being benefited,
- Kisan radio program is very popular among farmers. They should also get opportunities to share their view with the subject expert.

Major Recommendations

On the basis of the discussions with various stakeholders, following recommendations should be considered:

- The contingency budget of the KVK should not be curtailed, it should be linked with the activities of the KVK.

- For mandated activities such as FLD and OFT, support staff should be deployed as per the requirement of the district, it should not be uniform across the country.
- ICAR should introduced skill up-gradation schemes for the scientific staff deployed with KVKs.
- Technology dissemination should be more among small and marginal farmers.
- Non mandatory activities such as duties during elections, filling up of various forms time and again and work assigned by SAU etc. should be restricted as mandatory activities suffer.

5. KVK, Wardha

District Profile

Wardha is an old district of Maharashtra, bounded by Nagpur in the north east, Chandrapur district in the south east, Yavatmal in the south west and Amravati in the north-west. The district stretches over an area of 6309 sq. km. In terms of area, the district constitutes about 2 per cent of the total area of Maharashtra state. The total population of the district was 1,300,774 in 2011 of which about 27 % were located in urban areas. The river Wardha lends its name to the district that developed from a little village called Palakwadi. This village is the district Headquarter today. The area under forest in the district is about 15%. It has 8 tehsils, 512 gram panchayats, and 1361 villages.

Like most of the other parts of the country, Wardha too has a predominantly agrarian economy. The most important crops grown and cultivated in Wardha are Soybean, pigeon pea, cotton, sorghum, oranges, and banana. Cotton and soybean is the main crop. The average rainfall recorded in the district is 941 mms.

KVK is located in Selsura which was established by ICAR in the year 1979 for the Wardha district under Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The KVK farm in selsura is located at two sites, one at agriculture school (Polytechnic) campus site, which is about 10 km from Wardha town and other site is in selsura village. The area of the KVK farm is 22 ha. The KVK has its own building with training facilities. The manpower deployment is not adequate. Apart from the Programme Coordinator, Two SMS - Plant protection and Home science are posted with the KVK. The remaining vacant positions are needed to be filled by the State Agriculture University. KVK is undertaking various activities. Some of their recent activities are:

- Transfer to new technology related to agronomy, plant protection, animal husbandry, dairy science, and home science as per mandated activities.
- Efforts are being made to improve the socio-economic living standards of rural community by imparting practical training related to agriculture entrepreneurship,

activities like fruit preservation, tailoring etc. to the farmers of villages where the KVK has initiated intervention.

The officials of the KVK have explained about the various demonstration units of the centre which have a positive impact on the farmers across the district. In order to improve the socio economic status of the farmers the goat unit has disseminated improved breed and generated receipts for the KVK as well as the farmers. Vermi compost unit has organized wide campaign in the district for establishment of vermin compost unit by the farmers. Poultry unit is maintaining improved breed bird which have great demand among the farmers community. Similarly, the sericulture unit was established in the year 1998 and conducted training to the rural youth and farmers. The activities are being conducted in collaboration with district sericulture department. The KVK has its mulberry nursery and saplings are sold for mulberry plantation and to start the sericulture unit. Now more than 200 farmers are engaged with sericulture activities. The KVK in collaboration with Khadi & Village Industries Commission (KVIC) apiculture unit was established for coaching to rural youth.

Apart from the above demonstration units of the KVK it also has azolla, mushroom, mango grafting and fodder units.

During the discussion it was observed that the KVK has organized 10 training programmes in which more than 200 farmers have been benifited. Similarly, the KVK has organized front line demonstration on oilseed soybean- JS 9560, Pulse pigeon-pea BSMR-736/PKV TARA, Chick-pea and control of H. armigera in red gram etc in the recent past in different villages. During the year 2014-15 the KVK Wardha has organized 22 training programmes of one day each in which about 1200 farmers have participated.

Discussion with farmers at KVK

Interactions with the farmers

The survey team has interacted with the farmers in different villages selected for survey. The interaction took place in villages such as Loni, Easapur, Kolapur, Bapapur, Bachhera, and Sittarwadi. During interaction with the farmers the following suggestions were emerged:

- The KVK Selsura should have the soil testing infrastructure to assist the farmers of the area on the fertile position of their soil.
- Dissemination of the various KVK demonstration Units should be made available at village level.
- There should be certain provision for the seed subsidy and KVK should provide seed to the farmers at the time of the season.
- Exhibition should be organized for the farmers on high yield variety seeds at different locations by KVK.
- Financial assistance for setting up small business units at village level should be arranged for the poor farmers through KVK.
- The existing crop insurance scheme for farmers is not attractive, it should be made farmer friendly.
- A substantial portion of crops is being destroyed by the wild animal, the provision of fencing through KVK not through the line department should be thought to help the farmers in the district.
- Since 50 percent farmers are growing cotton, but there is no processing unit, there should be some initiative from the Government so that the dependency on outside the district should be reduced,
- It has been observed that the Kisan Mitra and Kisan Doot scheme is not very effective.
- Sericulture cultivation is growing but lack of marketing facilities in the district is a problem area and it should be resolved by the Government.

Key Recommendations

The officials of the KVK have suggested the following points for making the institution more effective:

- The ICAR should pay attention on the infrastructure facilities and related equipments required to address the mandated activities of the KVK.

- There should not be a heavy cut in contingency budget as the ICAR has reduced 40 per cent in the past which has affected the OFT and FLD work of the centre.

- The employees of the KVK are not given any medical facility, children education allowances are nil, no leave encashment etc. These aspects should be address.

6. KVK, Akola

District Akola is an important city of the Vidarbha region in the state of Maharashtra in central India. It is about 584 Km east of state capital Mumbai and 250 Km west of second capital Nagpur. The Akola district head quarter is located in Amravati division. It is a developing city with total population about 1,818,617 (2011 census). The district has an area of about 5,431 sq.km. which is the third largest city in Vidrabha after Nagpur and Amravati. The district has 7 blocks, 730 gram panchayats and 998 villages. The district is bordered on the north and east by Amravati district on the south by Washim and on west by Buldhana district.

The district has a very famous grain market, oil mills, pulses mills and is also known for the production of cotton. The IT sector is also growing at a very fast pace. The city is known for various cultural activities like classical music, spirituality, theater, sports, and literature. These activities and opportunities attract migrants and students from the other parts of the region.

Agriculture Profile of the District

Agriculture is the main occupation of the people in rural parts of the district. Cotton, soyabean, and jawar (sorghum) are the main crops apart from the other crops such as wheat, sunflower, canola, peanut, Bajra (pearl millet), Harbara (chick peas), Toor, (pigeon peas), Urad, and Moong (Green Gram), etc. Most crops are dependent on the monsoon, as only 15 per cent of Maharashtra's gross cropped area is irrigated compared with the national average of 32.9 per cent. Only 9.0 per cent out of the total cropped area in the district falls under irrigation. This is also one of the major causes of suicides by the farmers in the region. Bharat Krashak Samaj, one of the leading organization of the farmers is very active in Akola region to help the poor farmers.

KVK in Akola was set up in the year 2010 under an NGO, Rural Development & Rural Foundation (RDRF), which is located at Sisa near Udegaon under Akola taluka. The KVK has its own farm, office building, residential accommodation for the staff and other infrastructure facilities. Except PC all the 16 positions are filled. SMS deployed in the KVK are from the discipline of Extension education, Agronomy, Plant protection, Veterinary science, Horticulture and Home science.

It was reported that interventions by KVK has been done in all seven blocks through their mandatory activities. The concentration of KVK activities is more in distant villages. In the recent past KVK has covered about 530 villages out of the total 998 villages in the district. More than 50 per cent coverage was from the remote and distantly located villages. This phenomenon is unique in this KVK as in KVKs in general interventions are more in nearby places. SAU has a policy to cover remote areas with extension services. It was also revealed during the discussions that more than 18000 farmers have been benefited with the activities in the recent past. The

centre has conducted 80 front line demonstrations, 230 farmers trainings and about 400 technology dissemination during the recent years. A large number of technologies transferred by KVK have been implemented by farmers. Some of the technologies which are popular are:

- Use of improved variety JS- 9305 / AKM4/ Udid15/AKT8811/ JAKI9218.
- Management of soybean leaf defoliators.
- Integrated crop management.
- Ground nut decorticator.
- Cotton Picking Apron.

Interaction with Farmers

During the field survey team interacted with farmers in different villages such as Gaigaon, Zural khurand, Morgaon, Rui kheel, Bochera, Akoli Jamgir etc. Apart from these villages the visiting team interacted with the officials of Ujawal Mahila Bachat Ghat and Sahamridhi Mahila Bachat Ghat kind of Self help groups who were involve in the welfare and empowerment of the rural women. During the discussion the following points have emerged:

- As mentioned above farmers are dependent on monsoon, a provision of solar pump for irrigation purposes should be introduced by KVK with the help from the Government.
- Electricity voltage is the problem area. Farmers were of the opinion that they are willing to share the cost of transformer if KVK initiates the process.
- Farmers have suggested that there should be a soil testing laboratory at every taluka to guide the farmers.
- It was pointed out that weather related information should be shared by KVK through block head quarter.
- For crop insurance, officials of the KVK should be roped in while conducting survey.
- The connectivity with KVK should be very effective and efficient. The IT technology or phone services, profiles can be used for this purpose.
- Farmers engaged in orange cultivation have demanded more and more demonstration on improved variety. They also need training of packaging and grading.
- The local farmers have demanded for a cold storage for onion and banana in the district.
- There was a suggestion from farmers that KVK scientists should visit the villages at the time of sowing of the crop. The coverage of the OFT should be increased at village level during the season.
- A coordination between KVK and agriculture departments is extremely essential. For example, at the time of the distribution of seeds KVK expert can ensure the quality of seed.
- Customer hiring centre for agriculture implements should be there at block level. Some private centres are there but their services are not upto the mark.
- There should be tissue culture laboratory to provide information and planting material to farmers about new interventions in bio-technologies.

- Timely disbursement of subsidy on drip irrigation to the farmers.
- KVK should work out the system for checking the moisture in groundnut crop and the same should be disseminated among the farmers.
- To utilize the raw material of banana for making plywood and fibre there should be certain manufacturing units in the district keeping in view the banana production.
- Two SHG as mentioned above are very effective as a large number of rural female are coming forward for initiating economic activity with a very small investment and producing candy, turmeric pickle and powder, soybean laddu etc. The SHG is also supplies mid day meal to a few schools and attracting women folk for initiating their own venture.

Involvement of SHG in Women empowerment in rural area in Akola district

Key Recommendations

The officials of the KVK have suggested the following points for making the institution more effective:

- Akola KVK may be assisted to set up a soil testing lab as well as Farmers' Hostel
- Crop insurance scheme for the medium and small farmers should be introduced.
- There should be coordination among the different stakeholders who are working for the welfare of the farmers.
- KVK scientist should work in collaboration with the scientist of the SAUs and ICAR.

7. KVK, Ratnagiri

The Ratnagiri district comes under Konkan region consisting of nine tehsils, 1,306 Gram Panchayat and 11 Nagar Parishad. The district has a geographical area of 8.18 lakh ha. which is divided into three zones, namely, hilly tracks, plateau surface and coastal zone. The district is dominated by small landholders and about 45 per cent of land holdings are 1 to 2 ha in size. The

major soil type of the district is laterite and alluvial. The main crops grown are rice, millet, red gram, green gram, horse gram and dolichus bean. In summer, groundnut and some vegetables are grown by farmers who have irrigation facility. The district is well known for horticultural crops like mango, cashew, coconut, areca nut and spices like black pepper, cinnamon, nut Meg. Dairy, poultry, goat rearing and fishery are also growing as allied sectors of agriculture.

About KVK

KVK Ratnagiri was established in the year of 1983 which is located at Lanja village about 40 KM. away from Ratnagiri. It is functioning under Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (SAU), Dapoli District. The university is providing administrative support but KVK is facing difficulties in carrying out operations because university is located at a distance of about 200 km. Decisions get delayed due to the distance. Funding is from ICAR to university and then the funds are transferred to KVK as per the specific proposals. This is a time consuming process and timely action on the part of KVK gets delayed for want of timely release of funds.

Since the KVK is under university, university has asked them to function in four tehsils only. In other tehsils, university is providing extension services through other means. Therefore, functional areas of KVK are Ratnagiri, Rajapuri, Lanja and Sangameshwar.

Transfer to Technology – Some innovative methods

The KVK has association with Farmers' Scientist Forum which was started in 2008. This forum meets every month in KVK premises. There are about 40 active members in this forum which are from 8 villages. Women farmers are pro-active members of this forum. In this forum, farmers discuss about their specific problems relating to agriculture and related areas. The scientists from KVK and other stakeholders like experts from the agriculture department, NGO, analyse the needs of the farmers and organize demonstrations, training and other advisory actions on the basis of the assessed needs. This is a platform from sharing and learning and farmers get motivated from each other.

The study team had interactions with this farmers' forum. Farmers reported that while agriculture as such is not profitable, while seeing others doing some innovations in the field or using technology provides courage to experiment new things at field level. The forum encourages the participatory approach in technology transfer as well as provides extension services. A number of times lecture come demonstration using e-technology is adopted for providing information to farmers in this forum.

Meeting with Farmers Scientist Forum

A number of success stories were reported by the members of this forum to the visiting team. Farmers indicated that they attended a course in KVK in food processing. During this course training was given to prepare mango products like mango pickle, mango pulp, Aam papad, etc. Some of the farmers have started self-employment in this activity. Farmers informed that KVK provided new technique for ginger production, potato cultivation, tuber crop production and banana cultivation. Some progressive farmers have started black pepper cultivation and started marketing. The farmers who are members of this forum further transfer the new technology in their respective villages to other farmers. The Forum has contributed in capacity building of member farmers, technology adoption by farmers, crop diversification, agro-entrepreneurship development resulting in enhanced profitability.

KVK activities are organized in collaboration with other related departments. For instance, training programmes at field level are organized in coordination with state agriculture department. Some of the projects including training are being coordinated with ATMA. KVK is preparing projects for collaboration with Cashew industry. In the Farmers' Forum also experts are invited for providing solutions to the problems of farmers.

Smita (a widow) had been staying in Mumbai. She left that place and came to Ratnagiri. She took some land and started cultivation of Mango and cashew nut. She is now a well established women farmer who looks after the agriculture related work all by herself. She has formed a self help group which she is converting almost into a small scale industry. Many other women in the area come for her advice. She started her agriculture related activities with the help of KVK and the Farmers' Forum

Visits to Villages and interactions with farmers:

The study team visited a number of villages in Ratnagiri region including Jawadi, Bapere, Veral, etc. and noted the success of transfer of technology by KVK and other organizations. One farmer was trained in poultry which had spillover effect on other farmers. A number of farmers have started this activity. KVK has contributed to the incremental enhancement in production in agriculture. Some women farmers have been benefited with the intervention of KVK. In Veral village, one SHG had been formed. KVK advised them for starting some activity. They have hired some land in the village and started cultivation of vegetables. Their vegetables are sold at local level itself. The women sell their product door to door and earn Rs.3 to 4 thousand per month. KVK guided these women about improved seeds, disease and pest control etc. With the success of their activities they have purchased some agri. Implements also like water pump, power tiller, etc. Other Self Help Groups have also got motivated and are taking help of KVK to start some economic activity.

Agro tourism is coming up very well in the region. A tourism festival is organized in the name of 'Ratnagiri Paryatan Mahatosav'. A number of 'stalls' are given to farmers to display and sell their products including 'stalls' relating to agriculture technology. This is also a good platform for transfer of technology. KVK and other departments had been working together for organization of this Mahatosav. The study team visited Jawadi which is a non-intervention village and noted that agriculture is rain fed here and they are not aware of the activities of KVK. They are doing some innovations in agriculture on their own and started processing of their agriculture produce. Hybrid Cooperative Society provides them good quality seeds. Farmers have also purchased some machines like power tiller, grass cutter, etc. Generally, they follow traditional method of agriculture.

The Ratnagiri region has favourable agro-climatic conditions for producing Jack fruit. Hence with introduction of new variety it is produced in bulk. KVK provided training in processing of jack fruit. Some farmers prepare jack fruit leather which they dry in sun and sell in the market. During the visit in the villages it also came to notice that KVK motivated farmers to utilize jack fruit waste for vermin compost.

Women processing jack fruit in Rawari village

Farmers of non-intervention village did not use new farming technology except new seeds for paddy. They came to know about these seeds from a Cooperative society which is selling seeds. The village does not have any irrigation facility and depends on rain water. Most of the youth of the village are involved in the construction work.

Challenges:

- KVK does not have its own vehicle for field visits which is essential for organizing the mandated activities. The vehicle is more important because the region is hilly, the population is scattered and to perform various activities KVK has to cover a long geographical area. KVK does not have its own building and there is no facility for training in the premises. The training is given in the open area or in village.

- Farmers informed that while getting information from KVK about various implements and equipments available for mechanization for agriculture, the operation of various machineries is not clear. KVK does not have any implements and equipments to show and provide practical training on operation of various implements.

- The district is located in horticulture belt but no SMS Horticulture has been posted in this KVK. Therefore, the problems relating to horticulture do not get solved easily. For problems relating to horticulture, the services of one agriculture diploma holder are being utilized but the person has his limitations.

- The region is hilly and has small and fragmented holdings and therefore, a number of technologies cannot be used. The land is getting more and more fragmented which poses a great challenge for technology transfer. There is also problem of labour as people are educated and go for better jobs to the adjoining towns and cities.

- There is also lack of adequate facilities for soil and water testing; there is only one lab which is in Ratnagiri and it cannot meet the demands for soil testing from farmers.

Suggestions:

During discussions with farmers and state govt. officials, the following suggestions and action points emerged.

- Farmers have reported the problems of animals like monkey and pigs which destroy the crop. They require some kind of fencing or shed- net to control these animals. Farmers want that some subsidy is provided to them for this purpose and KVK should assist in this work. They were of the view that this work can be got done under MNREGA scheme.

- Most of the farmers have small land holdings. Moreover, the district has hilly terrain. Therefore, machinery and equipment available for agriculture are not suitable to this region. Mechanization should take place accordingly and small implements should be made available. They gave an example of Rice planter from China which is suitable for hilly areas. Such kind of machinery should be made available in India also.
- A number of farmers are interested in growing Alphanso Mango, but they are not aware of the technology, its management and post-harvesting. Farmers wanted that KVK should display the technology using video in various villages.
- Farmers require a number of implements, for example, they need processing implements for cashew nut, mangos, etc. They stated that tender cashew-nut can be used in preparing vegetable. But, it is very time consuming to take out tender cashew- nut manually. Some implement is required for this purpose. Similarly, jack fruit processing needs solar dryer. About two years' back farmers were given demonstration on Solar Conduction Dryer but they do not know from where to get this. Krishi Vidyapeeth has developed dryer for drying fish. This can be adapted for jack fruit, mango, etc. Power tiller available are not suitable for this area. Power tiller should be with gears and not with chains as with chain it does not work in mud. Spare parts of various implements are also not available which should be made available.
- The powder of cashew -apple is useful for medicines but nobody is doing its processing. The technology for this purpose should be developed.
- A number of researches needed in the Konkan region as the region is different from other states. The climate in Ratnagiri district is different from other areas and therefore, research is needed on mango and cashew- nut suitable to this region. Kokum processing can also be done in this area, but no technology is available. Due to rain, the crop of Kokum gets waste. Kokum powder is also useful for medicines.
- There is a good scope for research in developing implements and equipment suiting to Konkan region, a research centre should be set up for this purpose in this area.
- Training components of KVK should be modified. Farmers are educated and their training should be at the research stations so that they could grasp the technology better.
- It was also suggested that KVK and farmers together should do researches as per local area needs. A number of farmers are progressive and they have innovated new technology. KVK also have scientists who have good qualifications; a combination of both may bring new technologies that would be beneficial.
- Sub-divisional Agriculture Officer indicated that population in the district is scattered and therefore, a wide area has to be covered. Adequate facilities are not available with KVK. For example, KVK work relates to the farmers' field, but no vehicle is available in the KVK. There are also no facilities like training hall etc. available which hampers the activities. He also stated that KVK has specific expertise and therefore, has special role to play. Whenever any training or workshop is organized, expertise of KVK is needed. This phenomenon makes it different from other organizations imparting extension

services. He suggested that scope of work of KVK should be expanded and be need based. For example, farmers require précised soil testing. No modern labs are available which can test the soil with the required precision. Well equipped laboratories that can identify micro nutrients in soil are required in KVK. KVK should also be given the work of validation of indigenous technology.

- District Agriculture Officer gave a number of suggestions like off season production of floriculture should be researched and technology be provided to farmers. Management of weed is another problem in the area which needs further research. He stated that there is a need to have monthly workshops where KVK, State Government and farmers should interact and KVK should tackle individual level problems of the farmers. KVK should have wholesole responsibility in dealing with the farmers problems. There should be specific division of work among various departments. Research is also needed as to how to cut the cost of production.
- KVK should develop 'ideal farms' like organic farming, nursery growing, and floriculture so that all other could learn from it.
- Technologies are required for organic farming in mango, coconut and cashew- nut.
- Due to humidity, packed products get spoilt. Packing machines for the packing of processed products and cash crops are required. The machines should be made available at KVK or State Agriculture Department where farmers can get their products packed on payment.
- Production of jack fruit is in bulk in the district. Preparation of Jack fruit chips will help in preserving Jack fruit and selling it in the market. KVK should provide training in preparation of Jack fruit chips.

8. KVK, Kolhapur

Kolhapur is situated in the southwest part of the state of Maharashtra on the banks of the river Panchganga in the Sahyadrian mountain range. It is one of the constituent districts of the Deccan Fertile Belt. Due to abundance of water availability from rivers and an efficiently managed irrigation system, agriculture is the dominant economic activity in the district which has led to several agro-industrial activities such as sugar manufacturing, agriculture produce processing, milk and food processing etc.

Being the district headquarters, it is a large commercial and financial centre. Kolhapur is also an industrial city with approximately 300 foundries. A number of cooperative societies are functioning in Kolhapur District such as Co-operative Sugar Society, Co-operative milk societies, Co-operative Banks, Co-operative Marketing Societies, Co-op. Spinning Mills, etc. District Kolhapur assumes a place amongst the cities having highest per capita income in the country and is one of the fastest growing cities in Maharashtra (www.kolhapur.org).

The total geographical area of the district is 7685 square kilometers which is divided into 12 Tehsils and 1239 villages. The population of the district is 3,874,015 persons. Literacy rate of the district is 82.91 percent .About 65% of the farmers in the district have less than 2 acres of land. Main crops grown in the district are: paddy, sugarcane, soybean, wheat, soya gram etc. Amongst the horticulture products mango and banana are important crops. Milk production is at a large scale in this district. Kolhapur falls under three climatic zones, namely, Ghats Zone, Sub-Mountain Zones and Plains.

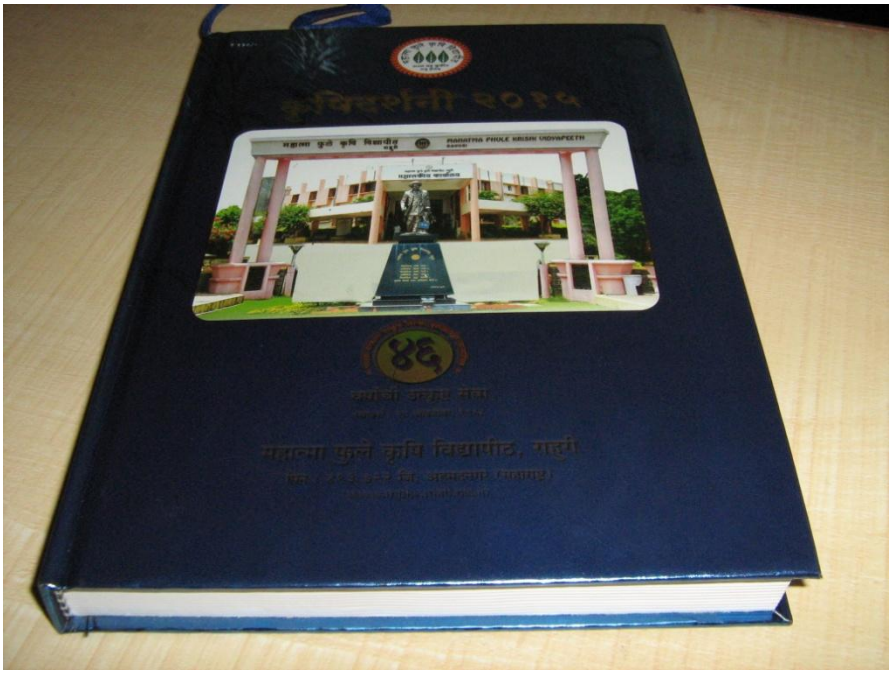
KVK Kolhapur was established in 1995-96 and located at Talsande village. It is functioning under D.Y. Patil Educational Society, an NGO. There is shortage of staff in KVK. Besides a Programme Coordinator, there are three SMS functioning in the field of Horticulture, Agronomy and Veterinary Science and one Programme Assistant (Computer) and one Office Assistant. The vacant posts were reported to be filled shortly.

Dissemination of technology:

A number of techniques are being adopted by KVK for dissemination of technology. KVK staff undertakes diagnostic visits, visits to farmer's field, farmer's visit, to KVK farm, impact assessment visits, etc. They organise group discussions, radio talks and television programmes. Information is also provided through publication of bulletins, articles in newspapers and interactions during farmers' rally. In addition, Kisan Goshthis, melas, exhibitions, farmers' seminars, animal health camps, exposure visits, technology weeks etc. are also organized by KVK.

KVK has launched Kisan Mobile advisory and Mobile Kisan Portal. Farmers have to register on this portal to receive the information. About 3400 farmers are registered on this portal. It was also informed that about 50-60 farmers visit KVK every month. KVK has covered about 50 villages through its mandated activities so far. ATMA is strongly associated with various activities of KVK, for example, technology weeks are organized in collaboration with ATMA. Exposure visits for farmers to various places are also organized in collaboration with state department and ATMA.

KVK reported that they receive technology directly from agricultural universities which are imparted further to farmers. There is an annual publication – Krishi Darshani which is published by Mahatma Phule University that also provides details of new technology. The publication is very helpful in upgrading the knowledge on various technologies.



Krishi Darshni

KVK reported that during the organization technology weeks, needs of the farmers are identified and their problems are tackled. A number of new technologies are also introduced during this programme. Under Crop Cafeteria programme six varieties of groundnuts were introduced. Mono cropping in sugarcane had been one of the major problems; therefore, KVK introduced inter-cropping for optimum land utilization and tackling other problems of mono cropping. The inter-cropping of onion and garlic has also been introduced in mango orchards. Training in post-harvest management has been provided. KVK has introduced a technology of growing sugarcane nursery in polythene bags. This has helped in better produce of sugarcane both in terms of quantity and quality. KVK has a data base of about 1000 progressive farmers and information about new technology is communicated through these farmers. In horticulture, KVK is trying to improve the crop of banana and developing tissue culture plants. Drip irrigation has also been introduced in recent past. KVK was of the view that on- farm testing which is a mandatory activity is not much beneficial as it is very time consuming and substantial money has to go into it. A technology comes to the KVK after in-depth research and therefore, this activity at KVK level should be stopped. On the other hand, field level mandated activities are more important and should be expanded.

Interactions in FGDs

The study team visited a number of villages and had interactions with farmers, farmers' associations and women groups. Some of the villages where the study team interacted are Ambup, Kini and Chinchward.

FGD at Ambap Village

The following emerged from the discussions:

- Farmers informed that marketing the product is a serious problem. Profit levels of farmers arenegative. Marketing committees are operated by traders and therefore farmers are not getting appropriate price. Govt. should intervene in pricing of the products so that cost is recovered and also some profit goes to the farmers. Farmers suggested that there should be uniform price for the product in the entire region. The low price of products discourages farmers to adopt new technology and increasing the yield. For example, due to introduction of new varieties of sugarcane, productivity increased but sugar mills purchased it below the minimum price. Thus more yields did not help the farmers. Cost of production should be taken into account while fixing the price of a product. Sometimes, farmers even do not get the price that is fixed by the Government.
- Since farmers are not getting appropriate price and due to the marketing problems, young generation is not willing to join agriculture. Working in nearby factories is preferred by young generation. Due to this fact, farmers are now selling their land to big entrepreneurs. New technology and economic support by Government in implementation of the new technology is needed to motivate young generation in agriculture.
- Sometimes farmers grow the crops they do not want to grow, for example, they understand that cash crops are better than traditional crops but farmers have to stick to the traditional crops like sugarcane which has a market. Sometimes, new technology does not

provide any benefit to the farmers. The new variety of sugarcane was introduced which was short duration variety, but sugar mills did not take the product early and farmers did not know what to do with the early product.

- Farmers from non-intervention villages informed that they receive information relating to technology from Agriculture Service Centers .They further added that KVK intervention is needed specially for promoting dry land horticulture as the village does not have irrigation facilities. In one of the newly adopted village by KVK, farmers expressed that intervention of KVK in the villages will be helpful though State Govt. Departments are also working in the village. They expressed that they want training by KVK in turmeric cultivation.

Challenges in Technology Transfer

- The shortage of staff in KVK is one of the major challenges. There is a demand for soil testing but no SMS in this area is available.

- Various technologies that have been imparted by KVK have resulted in high yield, but since there are no processing units and farmers do not get better price for their yield, they are discouraged for adopting the new technologies, they say that "what to do with high production when it cannot be sold."

- Technology should lead to the ultimate goal of better life for farmers but sometimes it is creating more problems. As stated earlier, the new short duration variety of sugarcane caused damage to farmers as sugar mills were not ready to pick up the sugarcane when it grew early.

- There are various organizations that are involved in giving technology there should be an adequate distribution of work. Farmers also get confused when so many organizations contact them. It was brought to the notice of the visiting team that while buying fertilizers, micro fertilizer is compulsory to purchase which is costly. Such malpractices should be looked into and KVK should intervene in such matters. Moreover, there is not equal distribution of inputs. For example, Farmers' Cooperative Societies get less quantity of fertilizers as compared to private shops who in turn sell at a higher price. Subsidy in drip irrigation is also not coming on time. Moreover, the farmers who have half an acre land do not get any subsidy as per rule. Such type of irregularities / policies poses challenge in technology transfer and should be looked into.

Suggestions & Recommendations

- The outreach of technology has to be increased so that it could reach the unreached. For this purpose electronic media and print media has to be put in place. The radio system

should be stronger. The local newspapers should publish about the new technologies at regular intervals, a KVK newsletter should be started at national level, such information should be provided in local language.

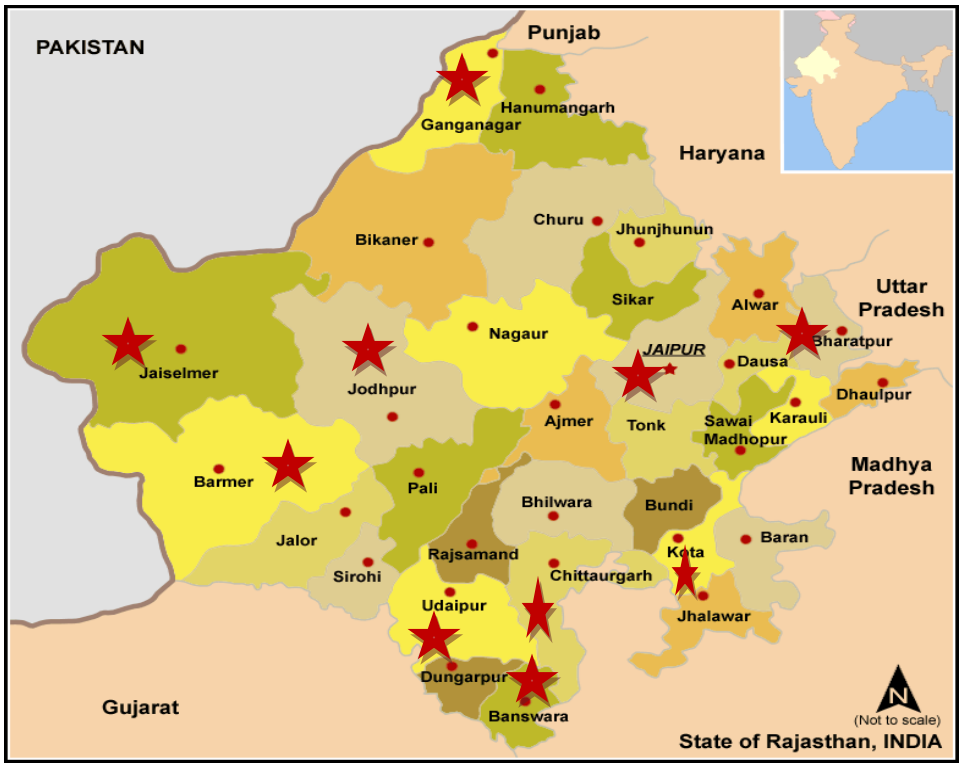
- There is a need to develop village wise repository and accordingly training needs should be assessed.
- Technical knowledge of KVK is better than other organizations providing extension services. It should plan need based activities.
- KVK can be training centre for rural youth. The education in agriculture in universities is theory based with a little practical orientation. KVKs can provide practical training. Agri-training should be started from school level.
- There is a demand for home science related activities not only in this KVK but across states. There is a need to provide SMS home science in each KVK and involve them in the processing of produce. Similarly, there is also a demand for pre and post harvest technology SMS. KVKs should come out of their routine activities and should be pro-active and innovative. There had been a post of Programme Assistant (Rural craft) but now this post has been abolished which should be revived and be posted with KVK.
- Sugarcane is in plenty in the district some farmers tried to preserve the sugarcane juice but this experiment was not successful; research is needed in this area so that sugarcane juice could be preserved successfully. Farmers also require technology to set up agro-based industries as well as financial support.
- Technology should come as a complete package. Green house technology needs to be imparted along with training in marketing. Training is also needed for organic farming. There is also need for ware -houses that can be established combining various villages. This will reduce the damage of produce as well as provide jobs to youth. Youth may be provided training in soil and water testing and be given a kit so that they could start their own economic activity.
- There needs to be one window clearance and simple procedure to get loans; at present the process is too long and lengthy. This would help youth establishing their own ventures.
- New technologies are coming but KVKs are not aware of these technologies. Some farmers are more innovative and are using liquid ferlitizer in banana and sugarcane. KVK has not provided such type of technology which is needed by other farmers also.
- It emerged that farmers are facing problems in getting tractor Drivers. Training in tractor driving may be provided by KVK, this may take care of the demand for tractor Drivers on the one hand and would help in retaining some younger generation in Agriculture sector on the other.

Rajasthan

A significant portion of the economy of Rajasthan is agrarian. The agricultural sector of the state accounts for 22.5 per cent. The arid state which receives not more than an annual rainfall of 25 cm thrives on agriculture that is done with irrigation systems. A major portion of the state is parched and infertile. In such areas, agriculture becomes very difficult. The total cultivated area of the state encompasses about 20 million hectares and out of this only 20% is irrigated. Ground water level is available only at a depth of 30 to 61m. Rajasthan farmers have to depend on different sources of irrigation that include tube wells, wells and tanks. The Punjab Rivers in the north, the Narmada River in the south and the Agra Canals from Haryana and Uttar Pradesh provide water to the dry lands of Rajasthan. Northwestern Rajasthan is irrigated by the Indira Gandhi Canal. The State shares a long international border with Pakistan. As in other parts of the country, Rajasthan has two principal crop seasons- Rabi and Kharif. The main Rabi crops are Barley, Wheat, Gram, Pulses and Oil Seeds. The major oil seeds are Rape and Mustard. The Kharif crops are Bajra, Pulses, Jowar, Maize and Ground Nut. The regions that are highly irrigated or receive water supply are utilized for the cultivation of improved high-yielding varieties of rice. Some places of Rajasthan that has black soil nurture the growth of major cash crops like Cotton. In some regions Tobacco is also grown. Horticulture is also coming up in the state. The fruits grown are Oranges, Guavas, Lemon, Pomegranates and Mangoes. Rajasthan soil is also suited for the growth of some spice plants, especially red chilies. Other spices are cumin seeds and methi.

There are 42 KVKs in the state that provide extension services and are involved with transfer of technology to farmers. Out of these 42 KVKs three are run by ICAR , 4 by NGOs, 2 by OEI and rest are functioning under SAUs.

As per the plan of the study a total of 10 district KVKs have been covered which have been indicated by red star 



1 KVK, Jodhpur

District Jodhpur is one of the major and historical cities of Rajasthan which has 10 blocks with a population of about 13.0 lakh. It is the second largest city of Rajasthan after Jaipur. It was formerly the seat of a princely state of the same name the capital of the kingdom known as Marwar. Jodhpur is a popular tourist destination, featuring many palaces, forts and temples, set in the stark landscape of the Thar Desert.

The city is known as the "Sun City" for the bright, sunny weather it enjoys all the year round. It is also referred to as the "Blue City" due to the vivid blue-painted houses around the Mehrangarh fort. The old city circles the fort and is bounded by a wall with several gates. However, the city has expanded greatly outside the wall over the past several decades. Jodhpur lies near the geographic centre of Rajasthan state, which makes it a convenient base for travel in a region much frequented by tourists. Of recent it has emerged as an education hub.

Average literacy rate of Jodhpur city is 81.56 percent of which male and female literacy was 88.42 and 73.93 percent respectively. Total children under 6 years of age constitute nearly 12.24 percent of city population. Jodhpur city is governed by Municipal Corporation which comes under Jodhpur Urban Agglomeration.

Agriculture and animal husbandry are the two most common rural livelihood activities. Climate of Jodhpur is generally hot and semi-arid, with rainy season from late June to September. Although the average rainfall is around 450 mm, the temperatures are extreme

throughout the period from March to October, except when monsoon rain produces thick clouds to lower it slightly. In the months of April, May and June, high temperatures routinely exceed 40 degrees Celsius.

Interaction with the PC, KVK and the Display of KVK

The district has two KVKs, one is under ICAR which is located in CAZRI Campus of the city and the other one is under State Agriculture University, situated at Palodi about 125 KM from the city. The KVK, Palodi was selected for conducting the survey, which was set up in the year 2012. The KVK is in its initial stage in terms of its mandated activities. At Present, it is functioning from a staff quarter and one of the Associate Professor of the University is holding additional charge of Programme Coordinator. All other sanctioned officials are yet to be posted.

Extension activities are the key concern of the Rajasthan Agriculture University to create awareness on new technologies and to accelerate the technology transfer among the farmers. Since the surveyed KVK came into existence in 2012 and so far no subject matter specialist (SMS) is deputed, Palodi KVK is mainly managing its activities through mobile advisory service. The State Government has made the allotment of the land (20 hectare) at Mohara village about 2 KM away from the Palodi town. Construction of building and development of KVK farm is yet to be initiated by the State Public Works Department.

It has been observed that the lack of resources in terms of manpower and infrastructure has hampered the activities of KVK to a great extent. With the limited resources the centre has initiated the following activities during the year 2013-14 and 2014-15:

a) Frontline demonstration (75 in Kharif and 30 in Rabi season) were conducted in four tehseel covering about 26 villages. These activities are being organized by PC with the help of experts from university.
b) One day training Programmes for the farmers were organized at block head quarter (two programmes) during the year 2014-15 in which about 500 farmers have participated. The major participation was from 400 female farmers from about 33 villages,
c) The telephone inquiry is being addressed by the PC, KVK from the farmers of the 26 villages where FLD was conducted by the KVK.

The visiting team has interacted with the Programme coordinator regarding the KVK's activities and problem areas. The following points have emerged:

i) On the functional basis, required number of SMS should be posted
ii) Construction of KVK building and development of Krishi farm to be given priority,
iii) Programme coordinator be posted on permanent basis with the KVK
iv) Necessary infrastructure and equipments to be made available to make it fully operational

Focus Group Discussion with Farmers:

During the study team's visit at KVK Palodi, individual as well as group discussions were organized at Palodi, Shergarh, Oasis, and Bap tehseel. The interaction with farmers at Bhimasar, Khichan, Lohawat, Fathsagar, Khari beri, Durgawati, Newara Road, Chand rak, Kelawa and Jaisala villages were conducted by the team. The following were brought out to the notice during the discussion:

Interaction with farmers in the fields

- Farmers were of the opinion that the KVK be equipped with necessary scientific manpower and infrastructure facilities so that technology transfer could be done,
- The district has errant weather conditions for agriculture; KVK should be equipped with weather forecast knowledge to avoid the casualties that are taking place now a- days among farmer communities,

- In case of natural calamities in the area, the role of agriculture scientists should be utilized in deciding the amount of subsidy by the Government. The officials of line department (Patwari)are not technically sound to assist the govt. in such matter,
- The role of KVK scientists becomes more authentic if they grow high yield verities in the farms of the farmers and demonstrate the results of a particular technology.
- The Government should initiate the system of crop insurance for the farmers in the district. The present insurance system is benefitting the big farmers only. The KVK should play a pro active role in this direction.
- The subsidy amount should reach to the farmer's account and not to the party who has given the loan to the concerned farmer.

Success Story of a farmer Through Self Innovation which made him from Zero to Progressive one

Mr. Goverdhan Ram S/O Shri Urja Ram, Village Nebra Road, Oasis Tehseel, Palodi, Jodhpur. A 45 year old and 12th pass farmer is an example of success story and also a role model in the nearby area itself. He has 6 hectare of land in which he started growing high yield varieties for agriculture and horticulture produce. In his household there are 18 members. In the beginning he took technical input from the agriculture university and also went to Gujarat to interact with the advanced farmers. Mr. Goverdhan has experimented new varieties of seeds of wheat and pulses in certain portion of his land. Similarly, he started developing a nursery of commercial plants and a vermi compost unit. For the last 4-5 years he is selling his own seeds and vermi compost and earning up to Rs.10 Lakhs per annum. Today he has almost all the farming equipments such as tractor, drip sprinklers, mini sprinklers, ajola unit of his own. Nearby farmers are visiting to his farm for education. It is noteworthy here that although it was his own innovation and initiative he has taken technical help from KVK and other institutions as and when needed


Innovation made Mr Goverdhan from Zero to Progressive one

Key Suggestions:

- FLD has the glaring impact among farmers. KVK should be equipped with the required facilities to conduct its own research also along with OFT,
- There should be an arrangement for soil testing either with the KVK or with the line department so that the amount of fertilizer etc could be ascertained as per soil condition and requirement of the new varieties of the seeds,
- Irrigation facilities have to be improved in the area as it has low and scattered rain fall.

2 KVK, Barmer

The Barmer district came into existence after carving it out from 24 parganas of the former princely state of Jodhour. On April 7, 1949 the state Jodhpur was merged in Rajasthan and four tehsils (former parganas) formed the new district of Barmer. Thus the district had 5 tehsils in the beginning, the name of the district come from the ruler Bhada Rao Parmer (Panwar) who is said to have founded the town in 13th century, when it was named Bahadamer. Since its formation in 1949, there has been almost no change in its external boundaries. However, the number of tehsils increased from 5 to 12. The district has been divided into 8 Panchayat Samities. The district is situated in the western part of the state and forms part of the Thar Desert. The total area of the district is 28387 sq. km. In summer, the temperature soars to 46 to 51 degree centigrade and in winter it drops to zero degree. Agriculture is the primary occupation of over 82 % of the population in rural areas with average land holding of 1-3 hectares. The main crops are pearl millet, coarse millet, pigeon pea, moth, lentil seeds and local variety of melon. The total population of the district is 21 lakhs scattered in 8 revenue blocks.

KVK, Barmer was set up in 1992 and functioning as knowledge and resource centre to address the emerging challenges of dry land agriculture besides providing technological knowledge and advisory to the farming community of the district. The KVK operates under the administrative control of the Society to Uplift Rural Economy (SURE), Danta, Barmer. The KVK is fully equipped with scientific and support staff. It has its own farm which is being used for seed production, commercial crop production for demonstration, production of medicinal plants etc.

Soil testing lab

Glimpse of KVK, Barmer

The KVK Barmer has its own building with administrative block, training halls, staff quarters with furniture and other furnishings. The senior most SMS, soil science is functioning as PC, KVK. Keeping in view the peculiar farming conditions and considering the problems of the farmers of the district, the KVK has identified the following thrust areas:

- Dissemination of dry land technology for Kharif, Rabi and Zayad crops,
- Dissemination of concept of agro forestry and soil conservation technology,

- Dissemination of water storage and water use efficiency technology like sprinkler, drip irrigation system, roof water harvesting,
- Introduction and popularization of arid fruit cultivation and management of orchards with special emphasis on after care of fruit plants,
- Up-gradation of indigenous breed and better management of livestock,
- Popularization of feeding technology of animals during droughts and scarcity conditions,
- Up-liftment of socioeconomic status of downtrodden through vocational training, and
- Introduction of fodder and medicinal crops in the district.

The total budget of the KVK is above Rs 80.0 Lakh per annum. During the year 2013-14 the KVK has covered about 50 villages and about 6000 farmers through its activities across the district. A total of 1300 FLD, 500 training programmes, 140 OFT were conducted during the last five years covering more than 15000 farmers. The interventions had the following impact:

- Sowing of improved seed on time,
- Seed treatment prior to sowing of crops,
- Using manures & fertilizers based on the soil and water status,
- Agronomic practices as per scientific recommendations,
- Cereals & pulses storage in scientific devices, and
- Vermi compost unit and organic farming.

Discussions in various villages with farmers

It has been observed that more than 35 per cent farmers have used improved seeds after the intervention of the KVK, which has resulted improvement in production per hectare. The productivity per unit area is still low and there is a growing problem of land degradation due to salinity and low discharge of ground water. Growing unemployment among rural people is a matter of concern. The KVK is determined to take up all these concerns. But it lacks adequate

financial support to develop infrastructural facilities to undertake the programme on large scale covering higher number of farmers in the district.

Interaction with the Farmers:

The KVK organized a focus group discussion in its campus while inviting the farmers from various places to interact with the officials of KVK and the visiting survey team.

The study team also organized interactions with farmers in various villages the such as Gadhra, Lalasar, Laxamanpura, Sawa, Langera, Rampura, Karim ka par, Gaharal,Kapsau, Bisinia, Khadin, Budhwada, Leelasar etc. The following points emerged during the discussions:

- The farmers were of the opinion that KVK should distribute seeds which require less irrigation. If needed more research should be done.
- Fencing of agriculture fields is the main concern of the farmers as wild animals destroy the mature crops; fencing work should be linked with the MGNREGS,
- There should be a provision of Government subsidy in case of some natural calamity,
- Government should set up a local Mandi particularly for cumin. Farmers are going to Gujarat cumin mandi to sell their produce and incurring lot of amount on transportation,
- There is no regular Cooperative Seed Distribution Centre in the district. The private shops are selling duplicate seeds; the problem should be addressed,
- At present, the provision of govt. subsidy is only up to 5 acre of land; beyond this no subsidy is available. Big farmers are also running in losses.
- Processing unit for Date Palm is needed as many farmers have started growing it in the district,
- Block wise system of weather forecast should be introduced,
- Government incentives should be given for the use of solar energy in agriculture,
- MGNREGS has created lot of problems in the area as people don't want to work in their respective farms, the scheme should be linked to agriculture,
- Animal husbandry is the second occupation in the district but the veterinary facilities are not enough; even for the grazing, sewar grass seed is not adequately available to the farmers.

1. Success story of KVK Barmer: Prosperity through technology intervention

Interventions of KVK

The farmers from Kamoipura and Bhandresh villages came in contact with KVK scientists and posed their agricultural problems relating to low agri productivity. KVK team studied the profile of village field and advised to participate in the training programmes on production method of Moth seed treatment with Rizhobium culture, integrated pest management (IPM) and scientific cultivation of Chilli.

On completion of the training courses, farmers were selected for Demonstration programmes under

technology demonstration for productivity and production of Moth. Improved variety seeds of Moth - RMO - 435 were provided by KVK. Regular field visits were also made by the Subject Matter Specialists under the leadership of KVK Programme Coordinator. *Kissan gosthis* were also organized at their field.

Impact of Intervention

On successful implementation of the crop production methods by the farmers, the production of Moth has increased from 3.5 quintal/ hac. To 9.759 q./ hac.

In the last decade with the use of tube wells and other techniques of water digging, irrigated area for agriculture is now three times more than what it was in 1990. In 1990 irrigated area in the Barmer district was only 50000 ha which increased to 250000 hectares in 2013-14.

In 2009-10 one group of farmer visited Inter-State tour at Gujarat & Maharashtra seen pomegranate then decided to grow pomegranate in their field. KVK, Danta-Barmer organized training programmes & motivated the farmers to take up the challenge. In first year about 20 farmers were ready to grow pomegranate variety Bhagva Sinduri under 50 hectare land with drip irrigation. The results of the very first attempt were very encouraging. Lush green fields of their farming not only inspired and motivated the farmers of their own village but the farmers of nearby village & other district are also ready to adopt and accept the cultivation of pomegranate. Pomegranate grown is making a profit of Rs. 50000 – 100000 from each hectare. The area under pomegranate cultivation continues to grow.

Emerging Suggestions

- The KVK is organizing the on campus training programmes, the budget provisions per participants have to be increased, as farmers generally compare the budget with ATMA programmes,
- There should be to & fro transportation re-imbursement to the farmers to make the training programmes more popular,
- The KVK should be provided a generator in case the electricity failure,
- Capacity building of KVK staff,
- There should be career advancement scheme for the scientific staff of KVK.

3 KVK, Jaisalmer

Jaisalmer district is one of the biggest districts in terms of area in Rajasthan scattered in 38,401 sq. Km. Its population is about 12 lakhs. The density of population is very thin – about 17 persons per sq. km. The district is also known as golden city because of the availability of golden colour stones. The district has an aberrant weather which is hyper arid partially irrigated western plain district. The average rainfall is 160 mm and the main crops are Bazara, moth, mung, gwar, and till in un-irrigated areas. The groundnut is grown in irrigated areas. Mustard,

Zeera, wheat, isabgoal is grown in Rabi season. The northern and western parts of the district have international border with Pakistan. The district has three blocks and 620 villages, two Nagar Palikas, and 128 Gram Panchayats. The average land holding is 10 hectares.

The KVK jaisalmer was set up in July, 1992 which is under the administrative control of Rajasthan Krishi Viswavidyalaya, Bikaner. The financial assistance is being received from ICAR, Delhi. Among farming community the KVK is also known as Mini Agriculture College as it is involved in giving guidance to farmers in agriculture & animal husbandry. Animal husbandry is the primary occupation in the rural areas followed by agriculture. So far as the mandated activities of KVK are concerned, the need based programmes are being managed by the centre.

It has been seen that most of staff positions both scientific and support staff are vacant. The PC is holding an additional charge and only one SMS (Horticulture) is posted along with 4 support staff. During the discussions with the officials it has been observed that KVK has organized 31 training programmes (During the period 2011-2014) for the farmers at various places in the district in which about 800 farmers have participated. The programmes include use of high yielding varieties for Rabi and Kharif crops and management of animal husbandry. The other extension activities include the visit to agriculture farms at various places to give guidance and to organize the farmer - scientist discussion at the farm. During the year 2013-14 the KVK has organized about 107 FLD, which includes 60 demonstration in Kharif and 67 in Rabi season. These demonstrations were conducted in 7 villages of the district. The nearest village where the intervention took place was 7 KM from KVK and the farthest was 17 km. Through telephone also PC is addressing the problems of the farmers.

Since the PC Jailsalmer is also posted with KVK Pokharan, during this period similar number of FLDs (80) was organized by the KVK in the district and the farthest village was 110 km from the KVK.

Major Constraints of KVK

During the discussion with the PC the following problem areas were highlighted:

- Only one scientist (Horticulture) is posted with the KVK keeping in view the area under coverage, the staff is negligible,
- On-campus training programme is very difficult to organize because of the distance factor and no transport facilities available to bring the farmers to KVK,
- Because of nearby location of Army Ammunition Depot, no construction is permitted in the KVK farm,
- There is no irrigation facility at KVK farm (no tube well) as a result, display activities are not available,

- More than 50.0 per cent farmers are growing Zeera (cumin) in the rural areas but marketing in the district is a problem area, farmers are going to Gujarat to market the product.
- There is an urgent need for SMS veterinary as Animal Husbandry is major activity in the district.

Interaction with Farmers:

The study team visited villages such as Chandan, Sodakaur, Bhairwa, Lathi, Lohata, Tejmalta, Basanjeer, Rupsi, jajia, Banda etc. The farmers have shared their view on agriculture and animal husbandry with the visiting members of the team. The emerging points are as follows:

Discussions with the farmers at Jaisalmer district

- Still the majority of the farmers are using traditional methods of farming; there is a need for publicity of high yielding varieties (HYV) and crop cycle among farmers,
- Progarmmes should be organized for the farmers of far off villages particularly pertaining to management of animal husbandry,
- The KVK should inform about the use of pesticides in different crops suitable to the climate of the local areas,
- Many farmers were of the view that KVK services in remote areas are not available,
- The land of the district has relatively low fertility and the areas need scientific help from the KVK,
- Block wise agriculture centres could have been more useful for the farmers to market their crop,
- There are a number of progressive farmers who are also experimenting. They were of the view that their innovations should be recognized and KVK should help in this process.
- Small and marginal farmers can implement the technology if they are provided resources to implement the same. They have very limited resources and cannot afford to implement a number of technologies advised by KVK.

- KVK should introduce a farming technique which requires less water and more production,
- There should becoordination in KVK and agriculture department, both the institution should work for the benefits of the farming community.

Key Suggestions and Recommendations:

The KVK, the following suggestions can be considered for improvement of effectiveness of KVK.

- The role of KVK in the district is vital in terms of providing guidance. The centre's capacity in imparting new technology should assess on regular basis.
- The KVK should be fully equipped as per the needs of the farmers,
- The centre should be given manpower particularly subject experts to assist the farming community,
- Processing unit for date palm (Khajur) should be available in KVK as per the requirement of the farmers,
- There should be a provision that an official should serve one KVK at least for five years to concentrate on the interest the farmer.
- Farmers in general do compare the activities of line department/ ATMA with KVK as these departments have more budget provision as compared to KVK accordingly less weightage is being given to KVK activities,
- Being a remote place, financial incentives should be given to KVK staff on the pattern of border districts of J&K and North East. There is also a need to put in place a promotion policy.

4 KVK, Chomu (Jaipur)

The city of Jaipur, which is Rajasthan's capital and largest city, is the district headquarters. It is the tenth most populous districts of India. Jaipur District has an area of 11,152 km Sq. It is bounded by Sikar District on the north, Haryana state on the extreme northeast, Alwar and Dausa districts on the east, Sawai Madhopur District on the southeast, Tonk District on the south, Ajmer District on the west, and Nagaur District on the northwest. According to the 2011 Census, Jaipur district had a population of 6,663,971. The district has a population density of 598 inhabitants per square kilometer. Its population growth rate over the decade 2001-2011 was 26.9 per cent. Jaipur had a literacy rate of 75.5 per cent. The male literacy rate was 86.0 per cent, while that of female was 64.0 per cent.

Jaipur district falls in agro-climatic zone 3- a semi arid eastern plain zone. The district is characterized by winter and hot summer. The mean maximum & minimum temperatures of the area are 40.6 degree centigrade and 6.2 degree centigrade respectively. The temperature fluctuates as high as 47 degrees centigrade in the month of May & June and as low as 1.0 degree

centigrade in the month of January. The mean average temperature of the district is 24.3 degree centigrade. The average rainfall of the district is 564 mm per annum. But for last five years, the rainfall is less than average and that too is scanty & scattered.

The major land area is sandy loam in texture except Tehsil Dudu & Phagi and part of Chaksu & Kotputli, Viratnagar, which have heavy soils. These soils have nitrogen deficiency and more or less normal in phosphorus & potash. The major kharif crops are groundnut, Bajra, Kharif Pulses and in Rabi, Wheat, Mustard, Barely & Gram are grown. The major vegetables grown are Tomato, Pea, Chili, Brinjal, Cabbage, Cauliflower etc..Ber, Amla, Bel, Guava, Lemon etc. are important fruit crops of the district. There is a good potential for horticulture development. Wells & Tube wells are major source of irrigation. For optimum utilization of water, sprinkler and drip irrigation systems are becoming very popular.

KVK is situated at village Tankarda on Chomu-Renwal road which is 40 kms away from District Headquarter on Jaipur-Bikaner National Highway. It is run by Pragati Trust-Jaipur, a voluntary organization established in 1993. The KVK has been trying to help farmers through transfer of technology, skill development, adoption of holistic approach to agriculture, farm women empowerment and promotion of innovative farming approaches. Operational area of this KVK encompasses 13 Development Blocks namely Govindgarh, Sambher, Dudu, Jhotwara, Amer, Sanganer, Phagi, Chaksu, Bassi, JamwaRamgarh, Shahpura, Viratnagar & Kotputli. The total number of villages falling under the jurisdiction of KVK is 2345. Till date, the KVK had made interventions in about 235 villages. During the study, the villages surveyed were Rajpura, Nabhpura, Devlai, Bagha- ka- bas, Abhaypura, Valakhas, Naghal Kota, ItawaJunsia, and Dhablai.

Role of KVK in disseminating technology to farmers

Some of the technologies that have been transferred to farmers and adopted by them in recent years are as under. It has been observed that the technologies transferred were need based which helped farmers in dealing with some of the problems they were facing leading to better produce both in terms of quantity and quality as reported:

In the field of Agronomy, dissemination of technology included training and Frontline Demonstrations (FLDs) for use of high yielding varieties in cereals, pulses and oilseeds; proper seed rate and spacing in cereals and pulses; and seed production programme of field crops. Some of the high yielding varieties are M- 13, M- 135 for groundnut; Raj- 3077 for wheat, Bio- 902 for mustard, etc. Owing to use of high yielding varieties in cereal, pulses and oilseeds, farmers reported that they were getting better yield than the traditional varieties. By following proper seed rate and spacing in cereals, farmers said that they were saving cost on seed. By weed management in cereals, pulses and oilseed, farmers stated to have high yield and income.

In Horticulture, dissemination of technology to farmers included training in vegetable cultivation under drip irrigation, use of tunnel and poly house; use of shed net; training and FLD in line sowing in growing vegetable nursery, use of plastic mulching in vegetable cultivation etc.. In water deficit areas, drip irrigation helped the farmers in 5 blocks. By applying line sowing in vegetable nursery, farmers in 3 blocks got healthy seedlings. In 3 blocks, use of plastic mulching in vegetable cultivation led to water saving and weed control. In 3 blocks farmers who adopted vegetable cultivation under tunnel reported early crop of cucumbers that fetch higher prices.

In Plant Protection, dissemination of technology was made for seed treatment, In 4blocks, by seed treatment in groundnut, the losses due to root- rot wilt/ collar- rot were reduced and crop production increased. By Integrated Pest Management (IPM of White- grub, farmers in 3 blocks were getting better control on White- grub and getting more yields of groundnut and pearl millet.

Technology in animal husbandry included balance feeding to dairy animals, improve cattle breed through artificial insemination, azolla feed, use of mineral mixture in cattle feed, etc. In a number of blocks, these measures led to increase in milk yield. In 2 blocks, by applying measures to contain infertility in cow and buffalo, the problem was reduced to some extent. These measures also helped in enhancing animal health.

Soil Science expert guided about nutrient management in cereals, soil reclamation through Gypsum, soil and water testing. KVK has soil testing laboratory and farmers were coming for measuring the soil health. In 4 blocks, integrated nutrient management in cereals led to increase in and better quality production. In 4 blocks, soil reclamation through Gypsum resulted in soil improvement. In 7 blocks after soil and water testing the farmers were using balanced fertilizers.

A number of implements have been introduced to reduce drudgery. For instance, revolving stool has been introduced for milking animals. This has benefitted especially women and old persons as it was difficult for them to milk the animals sitting on their feet.
Regarding home Science, interventions have been made in 2 blocks. The interventions were related to awareness generation about importance of balanced diet for child.

Besides the above activities, KVK organized field visits, demonstrations and training by concerned Scientists as per need of the farmers. KVK advised on input management in terms of seeds, fertilizers, pesticides, etc. KVK also attended problems that were faced by farmers during implementation of technologies.

Technology suitable for women:

Females were involved in a number of agricultural activities. Technologies transferred have been found suitable for women. For instance, drip irrigation is suitable for women. Mulching technique reduced the weed infestation in cultivation of crops which saved labour. Revolving stool technology increased efficiency of women while milking. These technologies have been reported to reduce drudgery in various activities carried out by women.

Entrepreneurship development

KVK has been found developing entrepreneurship among youth by extending support in:

1. Project preparation
2. Procurement of raw material
3. Assistance in getting loan
4. Technical training
5. Processing of products

There was abundance of vegetables and fruits in the area, and good potential for setting up small food processing industries. But the potential entrepreneurs were worried about the marketing of the product

Implementation of technology by farmers:

During the discussions it has been noticed that technology is implemented at a faster rate by rich farmers and who have large land holdings. Education also is an important factor as educated farmers have better ability to understand the importance of technology as compared with other farmers who are low in education. It was also noticed that farmers living near KVK/ city are able to get more help from KVK than those who are living at distant places.

Factors that hamper technology adoption

Some of the Factors which hamper technology adoption are poor financial conditions of farmers, non-suitability of technology for small holdings, high incidence of illiteracy which lead to indifferent attitude of farmers, unavailability and non-accessibility of good quality seed and planting material, unfavorable weather conditions, saline soil and water, etc. A need was indicated to do researches on these issues. Some glimpse of work in Jaipur below:


Discussions at village


Covered horticulture cultivation

Observations and recommendations

- Review of basic facilities available in the KVK's Campus reveals that at-least two Training Halls and stay facility for about 50-60 farmers should be available.
- Performance based increment in the contingency of best performing KVKs.
- Increase in the number of supporting staff particularly Technical assistants in all subject matters.
- KVK staff under NGO should be treated at par with the ICAR/SAUs Staff especially in respect of the age limit, experience and other service requirements in order to overcome the existing restrictions in their lateral movement to the senior positions. The fringe benefits should also be at par with other KVKs.
- Budget is insufficient for establishment and maintenance of latest technology demo units like ICT cum Museum
- Periodic monitoring and evaluation of KVK activities is needed for enhancing their efficiency and effectiveness..
- Provision of at-least one month inter-KVKs deputation of technical / scientific staff for their exposure on different areas and crop avenues.
- Zone-wise technical backup team should be constituted by ICAR and made available for helping KVK in any emergency conditions (For example sudden appearance of any insect-pest/disease in the epidemic form on the crops/animals in the concerned area). The discipline-wise members of this technical backup team should be selected from KVKs/ICAR institutes of the related zone.
- Every KVK should be targeted to organize at-least two campaigns (minimum two weeks) with the joint efforts of all SMS every year based on the problem of their territory. For example to overcome the mal-nutrition problem, promotion of seed treatment technology, adoption of potential varieties, breed improvement programme in animals etc.)
- KVK should organize more training programmes, workshops, conferences, demonstrations, with various stakeholders namely agriculture officers/ supervisors, dealers/ distributors of seeds, banking personnel, Anganwari women, school students on packaging practices of crops, Hi- tech horticulture techniques, seed treatment, candle and chalk making, fruit preservation, etc. This will lead to spread of technology horizontally

in the district, increasing awareness among farmers about improved farming practices, raising income/ income generating activities and will give better visibility to KVK.

- Oriental Bank of Commerce, and one NGO namely Shyam Sevasanskriti also organized training to farmers. Such efforts should be coordinated.
- There is a good potential for setting up of food processing industries. There is a need to strengthen marketing network for this.
- To sum up it was interesting to learn that though a large number of farmers were beyond the gamut of intervention of KVK, but a number of farmers adopted technologies in last three years in the following areas:
    - Use of drip irrigation
    - Use of Mulch techniques
    - Vegetable cultivation in Poly houses
    - Use of high yielding varieties in crops/ vegetables, etc
    - Weed management in crops
    - Seed treatment
    - Use of balanced feed in dairy
    - Use of mineral mixture in dairy
    - Use of Gypsum in Oilseed crops

Many farmers were also benefitted by spillover effect of these technologies.

5 KVK, Kota

Kota District, situated in the state of Rajasthan, covers a total area of 5217 Square Kilometres. For the purposes of convenience in administration, the district has been divided into a number of divisions. It has a total of 5 subdivisions, 5 tehsils, 3 sub tehsils, 26 tehsils and 204 expand patwar circles. The system of Panchayati Raj has also been operationalised to meet the goal of decentralization. There are 5 Panchayat Samitis, 158 Gram Panchayats, one Nagar Nigam and 3 Nagar Palikas in the district. Agricultural land occupies a total area of 521324 hectares. The city of Kota situated here on the banks of the Chambal River is at an important juncture of the trade route between Gujarat and Delhi. The Chambal Valley project here is among the big projects in the state of Rajasthan.

History of Kota district goes all the way back to the 12th century. The foundations of the region of Kota as a separate state were laid down by a Bhil warrior Kotya who set up a small fortification with a protective mud wall running around it. The independent state of Kota was formed in the 12th century. Thus, Kota as an independent district came into being.

The district is bounded on the north by Bundi District, on the east by Baran District, on the south by Jhalawar District, and on the west by Chittorgarh District. The district is famous for its reputed coaching centres that prepare students for IIT, JEE and medical examination is now the hub of educational institutions. It is also Asia's biggest manufacturer of fertilizers. The

district is surrounded by four power stations. These power plants provide the district an edge over other districts.

As per 2011 Census, the district had a population of 1,951,014 of which male and female were 1,021,161 and 929,853 respectively. The district has a population density of 374 inhabitants per square kilometer. The district has a literacy rate of 76.6 per cent. The male literacy rate is 86.3 per cent, while that of female is 65.9 per cent. The district has five blocks namely Ladpura, Sultanpur, Itawa, Sangod, and Khairabad covering a total number of 812 villages.

Kota is the industrial hub of the state of Rajasthan. There are a number of flourishing industries contributing to the economy of the district. There is a fine grained variety of limestone found here called the Kota stone which is very popular in construction. Established in the year 1985, Chambal Fertilisers and Chemicals Limited (CFCL) grew into the largest manufacturer of Urea in the private sector with an installed capacity of 1.5 million tonnes per annum. Its primary businesses are: Agri-Business (Urea fertilizer, Sugar, Farm inputs marketing such as DAP, Pesticides, Seeds, Agri retailing - Haryali Kisan Bazaars, etc.), Plastics (PVC and PVC compounds, Plastic building products - Fenesta), Chemicals (Chlor-Alkali, Chlorine based products). Other business interests comprise of Cement, Textiles and Energy Services. Instrumentation Limited (better known as IL) is a Government of India Enterprise set up in 1964 with the prime objective of attaining self reliance in the field of Control and Automation for process industry. Today IL is manufacturing and supplying state of the art control equipment on turn-key basis to various sectors and industries viz. Power, Steel, Fertilizer, Chemical, Petrochemical, Refineries, Pharmaceutical, Cement, Paper, Textile, Space, and Oil and Gas. Some of these industries as can be observed are related to agriculture sector and providing various inputs to this sector.

KVK Kota a leading district level Farm Science and Information Center, was established in 1992 for speedy transfer of technology to the farmers' fields. It is located at Borkheda village which is functioning under Maharana Pratap University of Agriculture and Technology, Udaipur. The operational area of this KVK comes under agro climatic Zone V in the south eastern part of Rajasthan. Out of a total of 812 villages KVK has made interventions in about 225 villages. During the study, the villages surveyed were Kaithun, Rajpura, Devla Manjhi, Kishanpura, Choma kot, and Choma maliyan.

Technology Transfer

Some of the technologies that have been transferred to farmers and adopted by them in recent years are as under:

- Some successful technologies that were disseminated by KVK had been for weed Management, Resource Conservation Technologies, Cropping Systems and Integrated Farming; KVK is producing around 1000 q. quality seed of cereals,

oilseeds, pulses, seed spices and 50,000 planting material, 30 q. Trichoderma, 10 ton Vermi-compost and Vermi-culture every year. Hundreds of farmers of the district and neighbouring districts are purchasing quality seed and planting material from KVK every year. Working as resource centre for providing input material in terms of seeds and planting material is extremely useful for the farmers.

- Soybean variety JS-335 which was common in Kota district failed due to infestation of yellow mosaic virus during the year 2008-09. The KVK introduced other recommended varieties like JS 93-05 and JS 95-60 as a substitute. KVK scientists made a campaign for spreading knowledge about these varieties through different extension activities. With the combined efforts of KVK and department of agriculture, more than 75 percent of soybean area in the district is now replaced by these new varieties.

- On horizontal expansion of technology KVK conducted 1050 frontline demonstrations on Soybean (JS 93-05, JS 95-60), Black gram (PU-31), Wheat (Raj 4037), Chickpea (GNG-469), Mustard (Bio-902), Coriander (RCr 436) and recorded 25-30 per cent higher yield. The majority of farmers in the intervention villages and in other villages as well is using these improved varieties and also adopted crop production & protection technologies. On the basis of the feedback from stakeholders, scientists are conducting location specific On Farm Trial (OFTs) at farmers field for solving of their specific problems.

- Regarding vegetable crops, dissemination of technology to farmers included training and FLDs for off-season vegetables, Nursery raising and Protective cultivation (Green Houses, Shed Net etc.). In case of fruit cultivation, dissemination of technology to farmers included training in trimming and pruning, and layout and management of Orchards. These efforts have brought enhancement in production and incomes. Off season crop of vegetables is providing good rates to farmers.

- KVK Kota is a nodal agency for Beekeeping. NHM and ATMA are providing subsidy to rural youth for initiation of apiculture. At present 500 units are operating in the district and each farmer is earning Rs.2.0- 3.0 lac per year through selling of honey, thus, the additional monetary return is about Rs. 10.00 crore.

- KVK has played a crucial role in empowering farm women. It has organised several vocational training programmes on food processing, fruits & vegetable preservation, stitching and handicrafts. It has helped them not only to become economically independent but also provided livelihood security. The KVK has assisted establishment of 70 Self Help Groups for women empowerment. KVK has introduced specific drudgery reduction technology. Rural crafts, and women and child care programmes leading to women empowerment. KVK has developed a nutritious processed soya food with the name of **"Shakti Ahar"** which has been applied for '**patent'.**

- Regarding Soil Health and Fertility Management, dissemination of technology to farmers included assistance in soil and water testing. In 3 blocks, the farmers intervention villages are using balance fertilizers and getting higher produce due to knowledge of soil health.

- Regarding Animal Husbandry, dissemination of technology to farmers had been in four areas - dairy management, poultry management, disease management, and feed management. In a number of blocks due to these interventions, farmers were getting higher output at a lower cost and maintaining better health of livestock.

- Interventions have been made in the area of plant protection. Some of the successful technology transfers have been in the area of Integrated Pest Management, Integrated Disease Management, Bio-control of pests and diseases, and production of bio control agents and bio pesticides.

- A number of capacity building programmes are being organized by KVK which include Leadership development, Group dynamics, Formation and Management of SHG, Mobilization of social capital, and Entrepreneurial development of farmers/youths leading to self- employment pursuits by trained. Besides, KVK is assisting in Integrated Nutrient management, protected cultivation technology, Information networking among farmers, capacity building for ICT application, low cost and nutrient efficient diet designing, production and use of organic inputs, and gender mainstreaming through SHG. In 2 blocks, a number of farmers have started operating agriculture and allied storage of farm produce at their farms leading to lesser loss of produce.

Other support provided to farmers for implementation of above technologies (Success Achieved)

The agriculture scientists of the KVK have provided the following support to the farmers in agriculture activities:

(i) organized field visits, demonstrations and training of concerned Scientists as per the need of farmers.
(ii) advised on input management.
(iii) solved the problems during implementation of technologies.

Impact of agriculture technology transferred on farmers trained/ advised (Success Achieved)

- Improved wheat variety namely Raj 4037 was introduced in the district with a meager quantity. Looking at the grain quality and high production potential, it was included in wheat FLD and seed multiplication. The variety was very much liked by the farmers of the district and it spread like wild fire. Thus it replaced old prevailing varieties like Lok-1, Raj-3765 & Raj-3077 and occupied about **80 percent** of wheat area in the district.

- Soybean which is a major crop of the district suffered a lot due to high infestation of insects like tobacco caterpillar, girdle beetle, semi looper, gram pod borer and other insects. Farmers were using high seed rates and closure spacing with indiscriminate use of insecticides. The KVK scientists suggested IPM modules including proper spacing, seed rates, mechanical control and mix cropping of sesame and spray schedules. Large number of farmers have adopted these technologies and reduced their cost of cultivation by judicious use of pesticides and tackled the problem of insects.
- The early sown mustard had severe losses due to early season insects like painted bug, saw fly and wire worm attack. Many fields have to be re-sown due to this problem. Looking at the results of thiamethaxam (35 FS) seed treatment in soybean, the chemical was also tried in mustard in an On Farm Trial and found very much effective at 2.5 g/kg seed in controlling insect attack in early sown mustard. A large number of farmers of Kota district are now using this insecticide in mustard as seed treatment to save crop from early infestation of insect.
- Looking at very high weed infestation in soybean crop and unavailability of labour, KVK scientists promoted herbicidal control of weeds using post emergence herbicide *imazathapyr and cholimurinethyl* during last five years. About 80 percent of soybean farmers have started using this chemical.
- Paddy is an important crop of the district in *kharif* which suffers due to diseases like blast and neck blast thereby ultimately damage the crop about 50 to 70 percent. Farmers were in the practice of using higher dose of pesticides. The KVK scientist suggested fungicides *Tricyclozole* 0.1% spray which was very effective in terms of saving of money and enhancing the productivity of paddy. Due to control of pest complex against use of *Acephate* 75 SP 500 g/ha, farmers adopted these pesticides against pest and disease in paddy.
- Garlic being a highly remunerative crop, the KVK promoted garlic cultivation through FLD and training especially in KVK adopted villages. Due to high economic returns this crop is spread in whole of the district covering more than **30000 ha area** during 2010-11.
- Seed spice crops like fennel & fenugreek were demonstrated at KVK farm and were shown to the farmers during their visit to KVK. Seed of these crops were also arranged from National Directorate of Seed Spices, Ajmer and included in the NHM FLDs. Due to suitability of these crops in the district and their high returns, the cultivation of fenugreek and fennel has increased during the current year.
- KVK introduced turmeric and ginger cultivation primarily at orchard sheds in village Haripura. Now large number of farmers in the district has started its cultivation as sole, as well as intercrops in orchards. KVK has arranged quality turmeric seed from Mandsaur district of M.P. in the year 2011-12 and made available to the farmers. This crop is being cultivated by more than 50 farmers in around 100 ha area now.
- Efforts were made to divert same area under fruit crops for higher income of the farmers through trainings, FLDs and other extension activities. As a results, guava, Aonla and orange and several papaya orchards were established in the area during last five years. Due to this, farmers income enhanced from Rs 10,000 to 100,000 per ha per annum.
- KVK is continuously imparting scientific dairy training to the farmers and rural youths in the district. KVK scientists use to guide the trainees regarding NABARD's dairy development scheme and helping them in preparing their loan projects. More than 100 farmers are helped in this way by KVK. Out of them more than 65 farmers have got their

loan worth Rs. 85 lacs sanctioned from different banks and started dairying in the district during last five years.

- KVK has taken an innovative programme of providing buffalo bull for breed improvement through RMoL funds. Three bulls provided by the KVK served more than 150 Buffalos and received improved progenies during last two and half years. With the impact of this programme a large number of farmers contacted KVK for buffalo bull even on payment of full cost.
- KVK demonstrated large number of farm implements like seed cum fertilizer drill, multi crop threshers, MB ploughs, garlic bulb breaker and cleaning machines etc. The large numbers of farmers have purchased these implements in consultation with KVK.

Implementation of technology by type of farmers:

It has been reported that technology is implemented fast by (i) rich farmers, (ii) farmers having large land holdings i.e. more than 10 Acre, (iii) educated farmers, and (iv) farmers living near KVK/ city.

Observations and recommendations

- KVK timely organizes Off Campus/On Campus Trainings, Demonstrations at farmers' fields and its premises. During the organization of these activities, scientists interact with farmers for their field problems and problems related to adopting new technology. Specific problems are transferred to Research System through zonal meeting and monthly workshops for further improvement, refinement and guidance.
- As has been mentioned by other KVKs also the Budget provided by ICAR is insufficient to meet out the expenditure on various activities like field day, Exhibitions, Educational Tour and other specific innovative programmes.
- Insufficient budget provision for establishment and maintenance of latest technology demo units like information centre cum Museum etc.
- Transport facilities should be provided for On-Campus training.
- Provision of Special Budget for utilizing ICTs in agriculture.
- Periodic monitoring and evaluation of KVK activities.

6 KVK, Chittorgarh

Chittorgarh district is situated in south-east part of Rajasthan and covers a geographical area of about 10,856 sq. kms. The district has a population of 15.44 lakh (2011 Census). The district has a population density of 197 inhabitants per square kilometer. The district has a literacy rate of 61.7 per cent. The male literacy rate is 76.6 per cent, while female literacy is only 46.5 per cent. The district is divided into 10 tehsils.

Agro-ecologically the district has been divided into two agro-climatic zones, namely, (i) Zone-IVA –Sub-humid southern plain & Aravali hill zone and (ii) Zone-IV B – Humid southern plain zone. The average annual rainfall of the district is 851 mm. The soils of the district are grey

brown loam, medium black, moderately deep and medium to heavy in texture. The major crops of the district are maize, soybean and groundnut in *Kharif* and wheat, mustard, gram and opium in *rabi* season. Very small area is used for cultivation of fruits (1350 ha) and vegetables (621 ha). Looking at the environmental conditions and suitability of soil, some parts of the land may be diverted for cultivation of medicinal plant like safed musli, ashwagandha, kaunch, lemon grass, *Aloe vera,* etc.

KVK, Chittorgarh was established in the year 1992 which is situated in village Bojunda, 8 km. from district headquarter on Chittorgarh by-pass National Highway No.79. KVK has a total 53.51ha land. Area under crop is 13.0 ha. Orchards and agro forestry has been developed in 12.0 ha and 5.0 ha, respectively. 3.0 ha land is under demonstration unit. KVK is functioning under Maharana Pratap University of Agriculture & Technology, Udaipur.

The team visited a number of villages to have first hand information. The villages surveyed are Lakshmipura, Jaisinghpura, Satpura, Ghora Kheda, Pipli Gujran, Hajia Kheda, Sukhwada, Delwas, Hoda, and Kannauj.

Role of KVK in disseminating technology to farmers

Some of the technologies that have been transferred to farmers and adopted by them in recent years are as under:

In the field of Agronomy, dissemination of technology included use of high yielding varieties. Some of the high yielding varieties which were introduced by KVK are Azad pea- 3 variety for peas; Raj- 3765 for wheat; Laxmi for mustard; RD- 2552 for barley; etc.

In the field of horticulture, dissemination of technology to farmers included practical demonstration at farms for early vegetable production, Custard apple cultivation as an orchard, Kinnow mandarin in the district and *mewar* region, Azad Pea -3 variety of pea, etc. Through early raising of vegetables, farmers were able to fetch a very good price for their produce. In a number of blocks across the district, farmers were getting higher rates of vegetables in off seasons. After seeing the success of Kinnow more and more farmers are coming forward to develop Kinnow orchards. Poly house cultivation is also in demand.

KVK gave practical demonstration at farm for use of mineral mixture in cattle feed. With the use of Urea Molasses, Mineral Bricks and mineral mixture in cattle feed, animal health has been reported to be improved. It subsequently led to increasing milk yield. Azolla feed has also been introduced by KVK leading to better animal health.

KVK is providing help in growing vermin-compost, and assisting in soil and water testing. By putting bio gas plant, the farmers were able to utilize cattle dung in an income generating way. Soil and water testing is helping farmers in using balance fertilizers and getting higher produce. By going for soil reclamation through Gypsum and vermin- compost, the soil fertility has improved.

Success of Technology and challenges

- Regarding early vegetable cultivation, in a number of blocks across the district farmers were getting higher rates of vegetables in off seasons.
- By coming across the benefits and importance of Kinnow mandarin Orchard, the farmers were getting inclined for maintaining orchard of Kinnow. But in this case, regular IPM was needed.
- With poly house cultivation, a number of farmers in the district were able to get good income. The main constraint was that the cost of technology is very high.
- By using Shatavari powder, animal health was improved. It subsequently led to increasing milk yield.
- By maintaining nutritional garden, addition of vegetables in daily diet of farm families led to improvement in family health along with income generation.

Observations and recommendations

- There was a dearth of good seeds. Moreover, its availability on time also needs to be ascertained.
- There was a shortage of state warehouse. These needs to be set up.

7 KVK, Bharatpur

Bharatpur district known as 'Eastern Gateway to Rajasthan' was founded by Maharaja Suraj Mal in 1733 AD. It was once an impregnable well fortified city, carved out of the region formerly known as Mewat. The trio of Bharatpur, Deeg and Dholpur has played an important part in the history of Rajasthan. Bharatpur is also known as LOHAGARH. The district has a total land area of 507073 hectares which is 1.48% of the total area of Rajasthan State. District in north is connected by Gurgaon of Haryana, in the east with district Mathura and Agra of Utter Pradesh, in the South it is connected with Dholpur and in west with Alwar and Sawai Madhopur districts. Three rivers the Ban Ganga, Rooparel, and Gambhir, cross the district. Total area of the forest in district is 30336 hectares, which is nearly about 6.43% of the total area of the district. These forests are largely confined in the southern parts of the district. The forests are dry deciduous type. Large dry area of the district is covered with the forests of Acacia nilotica locally called Babool.

From the point of tourism the district has a number of religious, historical and archaeological places of importance. These places mainly attract the tourists from within the country as well as abroad. The major places of importance are fort of Vijaygarh, red sand stone pillars and a famous breeding water bird sanctuary called 'Keoladeo Ghana bird sanctuary is near Bharatpur. Thus there is a lot of potential for development of Hotel Industry, Tour & Travel and other associated industries that have a direct link with agriculture.

Economy of Bharatpur district is dependent to a large extent on agriculture. A variety of crops are produced here. Among the main crops grown are millets, maize, wheat, barley and rice, and oil seeds like sesame, mustard, groundnut and tarameera. The major commercial crops are cotton, sugercane, tobacco, red chillies and potato.

Bharatpur district is known not only for agriculture production but for oil industries also. Mustard seeds and other agriculture products come to the market through Mandi established by Krishi Upaj Mandi Samiti. These Krishi Upaj Mandies are in Bharatpur, Nadbai,Wair, Deeg, Kaman, Bavana, Roopwas and Bhusawar. In year 1999-2000 four new oil industrial units were set up with a total investment of Rs.570.84 lakhs. In terms of major oil industrial units, Bharatpur has 50 units.

About KVK

KVK located in Kumher was established on 2nd October, 1988 under the administrative control of the Rajasthan Agricultural University, Bikaner. At present it works under Sri Karan Narendra (SNK) Agriculture Univeristy, Jobner, Jaipur. Since inception, this KVK has been endeavoring for the upliftment of socio economic condition of the farming community through scientific intervention in the agricultural and allied sectors.

The prime goal of KVK Kumher is to accelerate agricultural and allied production in the operational area besides imparting training as per needs and requirements of the farmers, farm women and rural youths including school drop-outs in the rural areas for self employment and enhancing the productivity. KVK is to reduce the time lag between generation of technology at the research institutions and it's transfer to the farmers' field for increasing production, productivity and income from the agriculture and allied sectors on a sustained basis. "Teaching by doing" and "learning by doing" through work experience is the principle methods of imparting skill training programmes which this KVK has adopted.

The KVK Bharatpur, has an area of over 21.27 Hectares. There are 9 blocks in the district with 1586 villages. Out of 1586 villages, KVK has reported to cover about 800 villages through its various activities. The total area of Bharatpur district is 5 lakh hectares. The cultivated area is 4 lakh hectares, out of this total cultivated area, 3.5 lakh area is double cropped. About 2.0 lakh area is under mustard cultivation and 1.50 lakh area is under wheat cultivation. The main source of irrigation in the district is shallow tube wells. Bharatpur is a flood prone district.

Discussions with KVK officials reveal that KVK has established network in collaboration with NABARD with 250 Kishan Clubs and 300 Farm Science Clubs at Gram Panchayat Level. KVK also organizes training incollaboration with ATMA for Krishak Mitra. Till now, more than 820 Krishak Mitra have been trained. KVK organizes farmers melas and exhibitions which is

attended by large number of farmers. This platform provides a place for dissemination of technology and firsthand experience. Farmers demand for Kisan Call Centres and continued communication through frequent radio talks.

KVK has reported a number of challenges and problems that hamper the effective functioning of KVK. There is undue delay in getting budget. It takes more than 3 months to get the year's first installment/grant. In the present system, the grants are routed through the Zonal Project Directorate to Directorate of Extension then to University and finally to the KVK. The process takes a long time. This must be looked into.

KVK has technological laboratory like soil testing but no technical assistant is posted. Moreover, some faculty from the KVK either gets transferred to college or gets additional charge of the college or hostel. This is a major constraint in the functioning of KVK.

University has opened a new Agricultural College in KVK campus just one year before and deputing the SMS to the University for taking lectures. Three out of six SMS have been transferred to College. Now only two SMS and one Project Coordinator are looking after the entire six SMS jobs. ICAR is giving salary to these SMS while they are working for the University. University is frequently shifting the faculty members for various activities but such movement is disturbing the routine mandatory activities of the KVK. There should be a system to keep the KVK staffs out of university control. Recruitment should be made specifically for KVK. KVK staff is not willing to do the extension services and frequently leaving the KVK system due to lack of opportunities for research, promotions and other benefits. Their work is also not fully recognized which further de-motivate them

The KVKs is located too far from the main place/city. The essential infrastructure needs in the campus itself. Adequate staff quarters are not available for the staff. Following infrastructure has been reported to be needed.

- Quarter facilities for the staffs
- Hostel facilities for farmers/students of vocational training.
- Supportive staffs (earlier there were 6 such positions under this category like, Cook, Gardener et. now it has reduced to 2 positions)
- Printing and Photo copier machines to display more pamphlets on time
- Bus/Van Services to bring farmers to KVK centre for training

- There is huge problem of networking in the campus. Non-availability of Internet services affecting the technology transfer and other mandated activities negatively.

- Each Scientist should be provided an Individual Computer connected with Internet
- Uninterrupted internet services in the campus are must for updating knowledge about the recent developments in the field.

- The farm implements available with KVKs are too old which are to be upgraded with recent equipments to get more efficient demonstration and dissemination

- There is a need for refresher course type training to administrative and supportive staff. Scientists are provided trainings to know the recent development in the field; similarly administrative/supportive staff also needs training to know the rules and regulations clearer and better.

- KVK should be given more autonomy and budget approval to start more demonstration units for different fields as per the location like dairy related activities are predominant occupation after agriculture in the district as every rural household has milch animals (mostly buffalos). In order to provide better service in the field such demonstration units are to be established.

Discussions with Farmers

The study team visited various villages. Beneficiary farmers have expressed their satisfaction regarding the services of KVK's extension services. Some farmers are not aware about the time and details of the KVKs activities and services. In the villages covered by KVK, farmers have benefited from some or the other intervention of KVK. Most of the farmers feel that KVKs activities and functions should be expanded and should be continued for better yield from agriculture and related activities. KVK keeps track with farmers through lead and progressive farmers.

Farmers reported that they have benefited from the following activities of the KVK

1. Sale and Distribution of Seeds by KVK.
2. Demonstration of use of Pesticides – a problem solving technique
3. Rain water harvesting
4. Refreshing of the wells through rain water harvesting
5. Hiring of machineries and equipments from or through KVK.
6. Self-employment related trainings like; Tailoring, Pickle making for females and Tractor Mechanic course for young males.
7. Cattle management camps

Majority of the farmers in the surveyed villages felt that, yield has been almost doubled after the intervention of the KVKs functionaries.

In short, KVK is dissemination of technologies in respect of pesticides, fertilizer use, seed application etc. which has helped farmers a lot. Use of bio-fertiliser has been enhanced after KVK intervention. Crop management practices, training regarding spacing of crops, harvesting practices have helped increase in yield of 15 to 25 per cent on an average. Training in animal health has improved animal health. This has led to increase in productivity of milch animals.

Interaction with the farmer in Shainthi Village in Kumher Block of Bharatpur

Most Significant Impact

With the help of KVKs, self-help groups for women have been formed in villages for fishery, poultry and for duck rearing. Women have been trained in tailoring and sewing machines have been provided to the trainees after the course. Trainees have thus been able to start the work on tailoring immediately after the training and to earn. KVKs have constructed bio-gas plants for encouraging organic farming, tanks for storing water and helped in construction of borewell for increasing irrigation facilities in many villages. After getting training and using the innovative technologies of KVK, some progressive farmers have created high yielding varieties of crops and have won national awards.

Farmers have realized the importance of organic farming only from the KVK. Organic farming has led to reduction in the farming cost, especially the fertilizer and pesticides cost. Increase in the ground water capacity through rain water harvesting, hiring of agricultural implements at subsidised rates (one of the sponsored programmes of the KVK) are the unique features which has made changes in the agricultural activities in villages. Some youths who got training from KVKs vocational stream felt that there is a real improvement in their living/earnings after the training at KVK. The vocational training is very attractive among the rural unemployed youths in the district. Some farmers were of the opinion that small and marginal farmers have been neglected and there is unequal distribution of the services of KVK.

Majority of the farmers feel that the location of the KVK is the main reason for not accessing the services. Lack of visits by KVK extension functionaries in the villages is another factor for not getting the KVK services. Small and marginal farmers feel that KVK should organize village level training progammes to cover all the farmers.

A Farmer with his Cattles who never heard about KVK (Shainthi Village)

General Observation and Suggestions

Farmers of the villages visited opined that shortage of water is the major problem. Irrigation is one of the most important pre-requisite for the success of new technology. KVK should provide for better irrigation facilities through supplying submersible pumps, digging borewell, constructing tanks etc. In the absence of proper irrigation facilities, farmers have to depend on the vagaries of monsoon for the whole year. If tanks are constructed in the villages, farmers can use water from tanks for at least eight months; rain water can be stored also in these tanks which reduces salinity of soil. If land is to be irrigated hiring pumps from others, farmers have to bear a huge cost, so submersible pumps can be given to the farmers at subsidized rates.

KVK should recommend for proper valuation of land by the banks at the time of sanctioning of loan. Farmers are of the opinion that land mortgaged by farmers is rated less by the banks than its actual market value. It has also been observed that farmers feel that land leveling machine is of great importance for cropping. So, it needs to be supplied at subsidized rate. Subsidization is also required for building biogas plants. In addition to land-levelling machine, seed-drill machine, sowing machine, trolley thresher need to be provided to farmers to enhance productivity and reduce drudgery. Consolidation of fragmented land-holdings is an important step for reaping benefits of new technology. Training may be organized by KVK for orchard cultivation for farmers. Less water is required for orchards and it has been proved to be remunerative also. Farmers may be motivated and trained to use water optimally and not to waste it. KVK may train farmers to take care of cattle at the time of delivery of calves. At present, no such training is organized by KVK. KVK should also recommend for increase in Minimum support prices.

In nutshell, the overall comments and observation of KVK activities can be summarized as;

- KVK's vocational training to rural youths has created a great impact in district- there is huge demand for such courses.

- KVK's services have not reached to all the farmers in the villages which are covered by KVK. Only the big farmers are largely benefited from the services of the KVK.

- Vast majority of marginal and small farmers are not aware about the services of the KVK.
- The cost of using KVK machinery and equipment is not uniform to all the farmers – it varies from farmer to farmer. There is a possibility that small farmers may not able to hire such machineries – it is always being kept by the big farmers. It was proposed that cost of hiring each machine should be displayed on the notice board.
- Still many villages are untouched by KVK
- Need more staff and resources to cover all the villages in the district
- KVK should be given autonomy from the University System to recruit the required staffs – otherwise concerned Zonal Project Directorate can recruit the required staffs for KVKs and appoint them under one umbrella system.

8. KVK, Sri Ganganagar

In ancient times Sri Ganganagar was a part of the Bikaner District. In 1949 the district of Sri Ganganagar was created out of Bikaner District. Economy of Sri Ganganagar District is dependent on agriculture and animal husbandry. Although Agriculture and animal husbandry are the main economic activities of the district, there are a large number of small and large scale industries too. Industries in Sri Ganganagar District are based on agriculture. Among the major industries are Cotton Ginning and Pressing factories, Mustard Oil mills and Wheat Flour mills and the famous Rajasthan State Ganganagar Sugar Mills Ltd., which is known for its Royal Heritage Liqueurs. It also has Cotton spinning and textile factories such as J C T Mills. Apart from these industries, many IT and outsourcing companies are establishing. Most of the factories are located in and around Sri Ganganagar City. Because of its prosperity from agriculture, Sri Ganganagar District also has a large number of automobiles. Sri Ganganagar has become one of the largest automobile markets in India.

The district is located in the Northern most part of Rajasthan and occupies an area of approximately 7984 square kilometer. It is surrounded by the state of Haryana in the North-Eastern side, Bikaner in the South, Hanumangarh in the East and the International border of India and Pakistan in the North-West. The District has 6 sub-divisions, 9 tehsils, 7 Panchayat Samitis and aproximately 2839 villages. It has 10 towns in total and as many as 320 Gram Panchayats. The District lies in the great *Thar Desert*, but the Ganga canal and IGNP canal are used for irrigation which has changed the flora and fauna of the district.

Sri Ganganagar district is also known as food basket of Rajasthan. Horticulture is also becoming popular among farmers. Kinnow (a citrus family fruit) is a popular horticultural product; other fruits of the citrus family are also grown.

About KVK

KVK Sri Ganganagar was established in the year 2004 and is under Swami Keshwanand Rajasthan Agricultural University. The KVK is working towards productivity enhancement of major kharif and Rabi crops of the district through optimum use of inputs for rationalization of cost of production.The programmes which are undertaken along with the mandated activities by KVK for farmers are telephonic advise, bio-fertilizer programmes, informing forthcoming activities of KVK during a month though radio programmes, use of mobiles etc.

Thrust areas of the KVK Sri Ganganagar

- Productivity enhancement of major kharif and Rabi crops of the district through optimum use of inputs for rationalization cost of production
- Awareness about INM, Water Management, IPM and IDM in crops.
- Livelihood generation for unemployed youth.
- Promote organic farming for conservation of natural resources, soil and human health.
- Dissemination of Hi-tech production technology of horticulture crops including emphasis on micro irrigation and protected cultivation technology
- Empowerment of rural women through strengthen their social, nutritional and economical aspects
- Use of Information communication technology.

The team visited KVK and interacted with programme coordinator and staff of the KVK to know the activities performed and its impact on the agriculture productivity. The team was informed that agriculture and scientific know-how and training is provided by KVK in-house as well as off-campus. Field days are organized where many farmers visit. KVK functions in close collaboration with state Government department and other agencies.

Besides training in new farm practices, KVK organizes training for empowerment of rural women through strengthening their social, nutritional and economical aspects. They train farm women in food processing, tailoring, and nutritional management, etc. One unique feature of training given to women by KVK is that on 8th of every month, KVK starts some training for women (date 8^{th} in May is observed as International Women Day).

The KVK has displayed very useful material on notice boards. Farmers can visit KVK and understand their problems and also find solutions through these displays. For example, the symptoms of low nutrition in plants, good agricultural policies for Rabi crop and kharif crops, for citrus fruits, the major pests and how to control them etc. are displayed in KVK premises.

Information displayed on notice board of KVK Sri Ganganagar

Interaction with the Stakeholders

During focus group discussion it was pointed out that there is a good coordination among departments involved in improving farm productivity and farming practices. Monthly meeting of scientists and KVKs in different villages are organized. In these meetings farmers are informed about new technology. Farmers' feedback is taken during such interactions on new technologies imparted earlier. Field meetings at block and district levels are organized in collaboration with ATMA. Kisan Melas are also organized in which all the related departments participate and more than 1500 farmers visit per day in such melas. Media plays a pro-active role and keeps in close collaboration with KVK farming community and other related departments. A number of issues are taken up by media relating to farming community and technology and articles/ information relating to these issues gets published from time to time in various local newspapers. This way print media is providing wide publicity and creating mass awareness about agriculture technologies.

It was mentioned that earlier during the season of rabi and kharif, all departments together use to go to farmers and provide training but this practice has been stopped. Seeds were also distributed at Panchaya Headquarters during organization of various camps. These practices should be started again.

Farmers indicated that there is a need for research on preservation of mushrooms. Youth is also demanding training in green-house fitting, para-veterinarians, motor binding and repairing. Under the livelihood mission budget is sanctioned for training and such need based trainings can be organized with the help of KVK and other departments.

KVK is following a cluster approach, it is necessary that they adopt two-three villages in a cluster in different blocks. After the demonstration, they should visit farmers on regular basis and the success of technology should be spread among others through organizations of field day, awareness campaigns and advertisements.

The study team had discussions at village level (Orki 1C Barri) which is located at the Border area of Pakistan. The farmers informed that due to intervention of KVK new seed of cotton was introduced which has higher yield and also good quality which fetches higher price as compared to old variety. A disease - leaf curl viral catches the cotton plant, the advice given by KVK, has helped in reducing the impact of the disease. In new variety such problems is not there and farmers are also using drip irrigation told by KVK.

Gram production has also increased due to introduction of new variety seeds (Gangaur Chana) with the intervention of the KVK. New varieties of seeds of mustard have been introduced by KVK which is highly productive. The advice given by KVK through soil testing and informing about appropriate quality of nutrients to be applied has helped in raising the soil productivity and production of the crop.

Crop insurance management needs to be improved keeping in view the interest of the small and marginal farmers.

Challenges:

During discussion with the officials of the KVK certain challenges were also brought to the notice of the visiting team. Major among them are as follows:

- KVK is short of staff,
- The Project Coordinator is having additional Charge of KVK and managing its activities,
- Only 3 Subject matter specialists are available in KVK.
- There is a vehicle for field visit but driver has not been posted.
- Farm land of KVK is located in Padampur which is about 20 Kilometers from the Office of KVK.

Success Story: Sand dunes turned into dollar boon

In the district in North-Western Plain Zone, sand dunes micro farming situation occupies about 40% of the net sown area.The major problems of these soils are high permeability due to coarse texture, low water holding capacity, poor fertility, frost and drought, low rain fall, there by poor productivity of crops. Hence, farmers have miserable socio-economical condition .There is undulating soil surface which makes irrigation impossible and highly inefficient. Cost of leveling is very high and farmers of the area are poor to do it. So, drip irrigation & fertigation with extra early vegetable production was demonstrated under natural Bio green house condition.

Pressurized irrigation system was recommended by KVK to avoid costly leveling of the soil and to

increase the efficiency of irrigation in comparison to flood system. Fertilizer was also given through drip system on sand dunes without disturbing sand dune micro farming situation. It saves 30 per cent water and 25 per cent fertilizer along with good quality production. Thatches of *sccharum munja* (Sarknda) were prepared and placed in North direction and extra early vegetables were sown under these thatches. They protected seedlings from low temperature during Dec., Jan. and high temperature during March, April to work as Bio green house shelter.Trainings were imparted by KVK and demonstrated at farmers field.

Quantitative and qualitative Impact of the Technology:

Extra early sown vegetables under natural Bio green house condition, fetched more market price due to early produce of vegetables apart from saving of irrigation water and fertilizer.Adopting this technology farmers not only saved Rs. 50 thousand to Rs. 1 lakh of land leveling but also earned Rs. 3 lakhs per hectare which is about ten times more than normal cropping system of the area.

The technology also had vertical and horizontal spread as the farmers of other villages such as Birmana region are adopting this technology to improve their socio-economical condition.Progressive farmer Mr. Jailal Kataria adopted technology with the help of KVK, and this year ten to twelve farmers applying this technology in the nearby area of Birmana village. Being the leader farmer for adopting and tranfering this innovative and higher remunerative agriculture techniques among other farmers of the area KVK farmer Mr. Jailal Kataria was awarded Halder prize by Hon'ble Chief Minister of Rajasthan during 2012.This also won Chief Ministers' ward.

Team Interacting with Farmers of Border area Village

Suggestions and action points:

During discussions with KVK officials, FGD with various stakeholders and farmers interactions the following suggestions were emerged:

- Even though media is playing positive role in the district, there is a need to give agriculture development news on a regular basis. The details of technical know-how in agriculture should also get a place in the newspaper on mandatory basis.

- There should be technical seminars and interactions at village level during the rabi and kharif seasons where scientists, KVK officials, state Government department officials, veterinary persons, cooperative societies, bankers, input dealers all should participate to facilitate farmers in adopting new technologies.

- There is a need to have amendments at planning state and there should be intervention at family level which is comprised of three groups - farmers with the age of 40 and above, women and youth group between the ages of 18 to 39. The old farmers should be told about latest technology, seed production, etc. as they will not go out for any other work except agriculture. Youth group should be given employment related training, for example, they may be given training in non-farm activities like fish rearing, bee-keeping, etc. to release pressure on agriculture. Such training can be imparted under National Livelihood Mission. After the training, groups of the youth can be formed and all departments together should assist these groups to start self employment ventures. For example, there are water reservoirs (diggy) at the farms. The youth group can start fish rearing in these reservoirs. There is also demand for mushroom production and preservation. Women can farm self help groups, thus, there will be three sources of earnings in families.

- It was suggested that there was a need for more KVKs as due to long distances farmers are not able to go to KVK and the visits of KVK officials are also not frequent. Moreover, meetings with farmers should be convened at village level.

- The technology of poly-houses those who have knowledge of cultivation in poly-houses only those should be given subsidy on poly-house cultivation. To enhance organic farming there is a need to provide some incentives. For example, a scheme can come like farmers who will go organic farming will get poly-house. The schemes of central Government and state Government should come through KVK.

- Farmers demanded that to provide agri. related facilities or subsidies the economic criteria should be followed and not the cost.

- It was pointed out that since the village is located at border area Govt. subsidies should be higher. Government provides subsides for Poly houses, and farmers are selected at random, this should be given to the trained farmers through KVK. They also brought out the fact that subsidy should be based on the economic status of farmers and not on cost basis.

- Subsidy on drip irrigation, solar system has been reduced. Farmers stated that by the time they understood the importance of diggy system of drip irrigation and solar panel system, the subsidy got reduced. Moreover, after receiving subsidy shops are fixed for purchase the fix shop provides inputs at a higher rate. It was suggested that there should be a standard fix for the inputs and not the specific shop.

- For crop insurance there is a rule that if 50 per cent farmers will be affected then only insurance will be given while insurance should be individual farmer based, there is a

possibility that some farmers are affected more than others even if 50 per cent loss in the entire area is not there. This anomaly should be looked into.

- There is a need to organize discussions during the season with larger group of farmers which should be attended by various officers from various departments otherwise every department tells a different story. There are multiple organizations without any coordination. There is also an overlapping of activities of various departments there is a need to have a coordination committee.

- A regulatory authority should control distribution of inputs at Panchayat level. At present some farmers get more quantity of inputs while so others do not get any. The subsidy on fertilizer and pesticides should be on limited quantity which will check their excessive use. In case some farmers need more such inputs they can buy from the open market. The subsidies should be given according to the land holdings.

- There is a dearth of agriculture labour NREGA scheme be linked with agriculture labour. Moreover, land holdings are getting small and small therefore agriculture labour should be linked to various other schemes.
- There should be farmers' representative in planning process.
- KVK should also train officials in local bodies.
- Cultivation should be as per local demand. Farmers' groups should be organized for cultivation of specific crop and the linked to marketing. Mandis are not available even at district level how the villagers will market their produce.

- Farmers informed that through KVK is informing them about new technologies such as new seeds, fertilizers, drip irrigation, use of solar energy etc. which is helping in raising the production of crops but produce is not fetching appropriate market price. Due to low price farmers are not very enthusiastic in adopting new technology. Hence support price of the produce need to be fixed at higher rates.

- Another important issue raised by farmers was regarding subsidy on fertilizers. They informed that for buying subsidized fertilizers distributors are defined, they sell the product at higher price than other distributors; they suggested that the farmers should be free to buy it from any distributors.

- Farmers also expressed their concern that they do not come to know about various schemes introduced by the Government for farmers' welfare. Information about all the schemes should be sent to Panchayat by the concerned departments.

- There should be a separate regulation for the farm labourers. Farm labourers should also be given training in agricultural operation, hence a skilled workforce for agriculture may be developed. Mini kits are provided to farmers, it should also be given to Agricultural labourers.

- Minimum support price should be fixed on the basis of the cost of cultivation. Price of the product should be declared before the sowing of the crop so that farmers who

cultivate the particular crop are well aware about the profit which they will get in producing a particular crop.

- Farmers should come forward and from their own cooperative for marketing of their production. KVK should provide crop-wise training in marketing from sowing to packaging of produce to the farmers. This will help farmers in marketing their production, reducing influence of middlemen thereby increased profits. Farmers suggested that each village should have storage and a market for sale of agriculture production.

Tamil Nadu

Agriculture is one of the predominant sectors of the State economy, as 70 percent of the population is engaged in Agriculture and allied activities for their livelihood. The state has as an area of 1.3 Lakh sq. km with a gross cropped area of around 63 lakh ha. It has all along been one of the states with a creditable performance in agricultural production its farmers relatively more responsive and receptive to changing technologies and market forces. There are 30 KVKs in the state involved with extension work in agriculture. Out of these, 10 districts have been covered for the detailed study. The districts selected can be seen in the following map indicated by arrows. ☆

Focus group discussions have been convened in all the ten districts and outcomes are indicated below:

1 KVK, Kancheepuram

The district is rich both in its agricultural output and industrial growth. Half of the Blocks are highly urbanised with industrialization, while remaining have agricultural products like paddy and horticulture.

KVK, Kanchipuram was established in 1985 under Tamil Nadu Veterinary and Animal Science University, Madhavaram, Chennai. Its location is easily accessible and it is well connected by bus, train and other means of transport. People are aware of the KVK activities in the district. There are 1,137 revenue villages in the district. About 5-6 villages are selected for coverage of mandated activities every year. About 60 percent villages are yet to be covered by KVK. The KVK has both male and female officers, which facilitates activities of KVK to percolate among women farmers also.

It was also observed that a large number of non-farmers visit the Centre for advice in setting up kitchen garden, keeping of fish (Aquarium - Colour Fish), duck, desi chick, horticulture crops and seeds etc. due to the fact that the KVK is located in the city.

Mandatory Activities and new technologies: Vast majority of the beneficiaries expressed their satisfaction over the training and demonstrative activities of the KVK. They felt that their knowledge, yield and income from farm have increased after the intervention of the KVK. However, some farmers expressed their dissatisfaction with KVK – by accusing their bias in selection of farmers but in the long run they stated that they also benefitted after seeing the impact of new technology.

* A number of new technologies have been introduced by the KVK like organic farming, cost reduction methods, integrated farming, optimum utilization of available water, improving quality of grains/products etc. The KVK has become successful in awareness generation about these new technologies but the coverage and services of KVK are to be increased to benefit more farmers in uncovered villages.
* Another important role played by KVK is intervention in fruits and vegetable cultivation in the district. Sowing area under these crops has increased on the advice of KVK and so the farm income.
* Due to advice on veterinary related issues to farmers, cattle population has increased. Dairying and related activities is an allied activity in majority of the villages in the district. The KVK has provided advice regarding the cattle feed seeds (grass) and Asola, one of the high protein cattle feed, which can easily be produced by farmers. Both the activities have benefitted farmers.

Success Story - Weekly market

The KVK is organizing a weekly (every Saturday) market for the beneficiaries of the KVK. Fifty farmers have been given space (empty place in front of the office which belongs to State Agriculture Department) to put their items for sale. The condition is that, farmers should be KVK's beneficiary; they have to produce and sell their own products or they can procure and sell the products of other KVK beneficiary farmers/trainees. The weekly market is a recent initiative of the KVK which has become very much successful. Ducks and other small birds (Kadai), rabbit for farms, medicinal plants, medicinal juices and powders, high breed goats, seeds and coloured fish, handicrafts are popular items available in the market.

Weekly market Board Captions should be below the photo

Stall at KVK's Weekly Market

Smt. Vijaya (left) in the above picture, who got training at KVK and also some inputs initially, now she is earning Rs. 3-5 thousand per week from selling at the weekly market. She has become economically sound.

Smt. Kasthuri in her Stall

Smt. Kasthuri studied up to high school. After the training and demonstration at KVK she started a shop at nearby city in addition to her agricultural activities. She has 6 cows, 30 goats and agricultural holding, and is also managing the shop. She is now an employer as she has given employment to one girl. She owes her success to the KVKs help and guidance.

Smt. Egambal (60+) is another successful farm woman in the district. She won best farmer award from the state government. She has transformed from an illiterate village woman to one of the leading trainer in the field of agriculture. She is a role model for many farm women in the district as well as to other districts. Initially, she had less than 3 acres of poorly maintained land. After getting the advice of KVK and the state government on new technologies and advanced method of cultivation, now she has more than 20 acres of land, milch animals and other agricultural implements. When she got initial success in the yield it tempted her to go to officials to ask more details about farming practices. Day by day and season by season she experienced some betterment in farm activities and visible improvements in earnings from activities. She started buying lands from others. She has given good education to her children and all of them are in good positions while she still pursues agricultural activities.

Impacts and Suggestions

Kancheepuram, KVK has good location and is easily approachable. It has very good infrastructure. The KVK has initiated a number of innovations for the benefit of the farmers. The Center organises weekly market for the KVK beneficiaries. They are in the process of introducing a mobile KVK (Mobile Van with equipments ready to operate). It was observed that in KVK-covered villages, cultivation pattern has completely changed; there is improvement in the living standard of the farmers due to better systematic cultivation, use of less fertilizer and pesticides, economic use of water, production of bio-fertilizers for self use etc. The KVK could also convince farmers to use fertilizers and pesticides in the whole area which reduced the cost by half. Earlier, one farmer used to spray pesticides and insects used to move to other land. Similarly, change in cropping pattern helped the farmers in many ways. More people started keeping milch animals in addition to agricultural activities. The KVK provided a health nutrient mix for cattle which helped the farmers as cows became healthy. It created massive awareness among the farmers and this leads to dairy development in the district as well.

There are certain challenges that need special attention for better performance of KVK. These suggestions came out during the FGD with various stakeholders:

- The KVK should be strengthened by adding more field staff exclusively for extension visits as the district area is spread over 60-70 km and needs vast travel from one corner to
- To give more field assistance to farmers there is a need for more middle and lower level extension workers with practical knowledge for providing guidance and regular contact and follow-ups.
- Due to cluster approach KVK has been able to cover less than 200 villages out of 1,137 revenue villages since its establishment.
- More frequent field visits are needed during the season which will require not only the human resources but also financial resources.

2 KVK, Perambalur

Perambalur is smallest district in the State. There are only four Taluks/Blocks consisting of 152 revenue village. Perambalur KVK is functioning under a non-governmental organisation called Hans Roever. It was established in 2005. Since its inception the KVK's services have reached to more than 60 villages and in collaboration with the state government department they have covered another 20 to 25 villages. In all, they have their presence in about 50 percent of villages in the district.

Maize is the main crop of the district followed by cotton. Some success stories of transfer of technology have been discussed below:

- Introduction of improved variety of Maize (CHM-6 -a variety developed by TNAU which increased the yields from 25-30 bags per hectare to 40-45 bags per hectare.

The new variety of Maize CHM-6 – Special feature is full coverage of high quality grains

- Introduction of improved variety of onion –farmers prefer the new variety and majority of them received the seed from fellow farmers; yield has increased by almost double.

- New variety of Turmeric, a recent crop received from nearby district introduced by the KVK. There is a huge difference between the old traditional variety of turmeric crop and the new one

Farmer Saravanan, Annamangalam Village in Adaikkampatty Block adopted new cropping pattern suggested by KVK - Turmeric Crop which requires less water and very limited fertilizers.

- Introduction of organic fertilizers/pesticides – Popularized the use of organic fertilizers and less use of pesticides among farmers. A large number of farmers are following limited use of pesticides (spray) and more use of organic fertilizers.

- Introduction of drip irrigation – Very few farmers were aware about the use of drip irrigation. After the training at KVK large number of farmers started using the technology of trip irrigation. The district is one of the dry districts in the state; therefore, this technology has been adopted immediately by the farmers.

- Introduction of new variety of Cotton by KVK

Cotton cultivation (Farmer Chandra Sekaran)

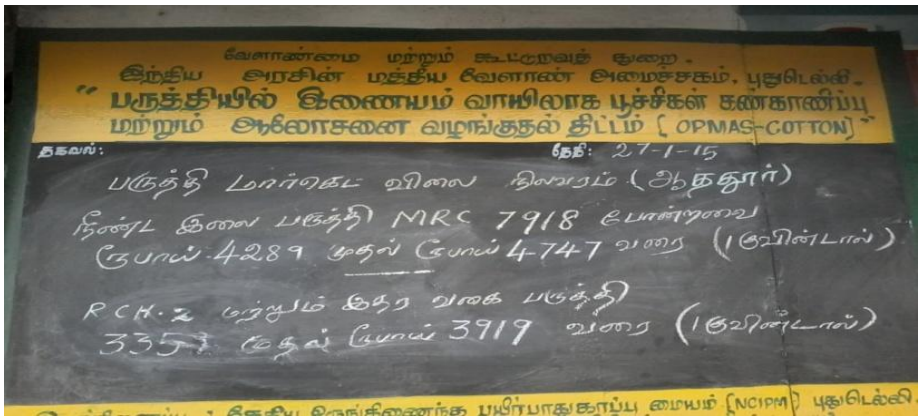
KVK introduced a new variety of cotton two years back. While with old variety cotton, the yield was maximum three times; the new variety is producing cotton more than 10 times per plant.

- Vocational training to youths – The KVK has provided vocational training to youth on producing organic fertilizers, value addition and food processing etc. A number of trained youths/farmers have started their ventures. Youth needs exposure and additional inputs such as help in machinery and equipments for further expansion of their activities.

- Training to female SHGs – Training has been given to 25 Muslim women members, out of these, 15 have started their work (cutting and tailoring) after the training. A special initiative was made by the KVK to train Muslim females at their place itself as they were not inclined to come out to far-off places. A common place was identified and one instructor (female) was hired as trainer to train these women. Training was imparted for six months. This is one of the most successful trainings organized by the KVK.

  Apart from these, introduction of cattle-feed crop (seeds were distributed by KVK), new high breed variety of goats (a new cross-breed variety from Kerala – Talaserry Goats), desi-hens are also significant success of KVK in the district. There is a new variety of Lemon Tree which attracted many farmers. This gives very good yield within a short period with high quality of lemons. Farmers were also taken on exposure visits by KVK to Gujarat, Nagpur and Coimbatore and learnt about various new technologies. More such visits on regular basis are demanded by the farmers to enrich their knowledge.

Farmers were given text messages through mobiles about the cropping pattern, precautionary/preparatory activities before and during each season. Price of cotton, maize and onion in the nearby markers and in regulated markets is also forwarded through short messages. Big farmers are largely using this service. Another successful dissemination of information under KVK is display information on Notice Board by the KVK at a common place in villages, which disseminates the latest information about the KVKs activities and farming details for that particular area.



Notice Board Displaying Information on Prices for Cotton

The KVK is facing many administrative and managerial constraints which hamper its functioning:

i) Difference in pay structure, perks and facilities – In comparison with other KVKs the NGO category KVK staff are not being given equal pay and perks, therefore, experienced SMSs are not willing to join the institution. Only two out of 6 SMSs have more than two years of service in this KVK.
ii) Limited budget provisions as compared with University or ICAR KVKs even though mandatory activities are uniform to all KVKs
iii) No budgetary provision for creating the infrastructure in KVK
iv) Delay and reduction in annual budget allocations
v) No provision to create more demonstration/explanatory units in KVKs.

Other Observations

a) The KVK has been able to reach interior villages.
b) Majority of the benefited farmers have also benefited from state government departments and NGOs (Horticulture, Agri-engineering, ATMA, and other departments)
c) Some of the farmers have expressed dissatisfaction over the services of the state government.
d) Uncovered village farmers are asking for the services of KVK in their villages too.
e) More awareness is required about KVK activities and services. Those having awareness are better using the KVKs services.

During the FGDs which were attended by more than 60 farmers from all the three blocks appear to be satisfied with the services of KVK. Impacts are visible in many villages. It is reflected through the fact that, more and more farmers expressed their interests in learning new technologies from KVK due to huge benefit from the already learned practices.

Perambalur, KVK is under the category of NGO. The issues and problems of this KVK are different as compared to the other KVKs under State Agricultural Universities or ICAR. Interactions brought out the following challenges:

Budget: As compare to other KVKs, the KVK under NGO is receiving very limited budget. There is undue delay in getting the sanctioned budget as well. It takes more than 3-5 months to get the year's first grant. It was pointed out that ICAR may consider sanctioning the grant directly to the KVK as is happening in the case of Agriculture Technology Management Agency (ATMA).

Faculty: The perks and allowances to scientists (SMSs) are not at par with other KVK scientists. There are no promotion provisions for the SMSs under this category of KVK. Experienced SMSs do not prefer to join these KVKs. Only 2 out of 6 SMSs in this KVK have more than 2 years' of experience, remaining SMSs have less than 2 years' experience. This raises the issue of quality of services to farmers.

Infrastructure: Since the KVK is located far from the main city area, essential infrastructure is needed in the campus itself, such as:

- Staff Quarters
- Infrastructure for farmers/students for training/vocational training
- Human resource for laboratories and other supportive staff – Earlier there were 6 such positions under this category like, Cook, Gardener etc., now it has reduced to 1 position only.
- Bus/Van services for bringing farmers to KVK centre for training

Demonstration: In the district, the dairy related activities are predominant after agriculture. Almost every rural household has milch animals (mostly cows). In order to provide better service at field level, more demonstrations are needed.

***Food/Allowances to Farmers*:** Rs. 40/Rs. 75 per participant per day for food and snacks is not enough to meet the minimum requirements of the trainees. It has not been revised for long.

3 KVK, Dindigul

The KVK is under the Gandhigram Rural Institute (Deemed University of the Central Government) and was established in 1989. The district is a predominant producer of the flower (Jasmine) followed by fruits like grapes and Chappotta in the state. Millets and other cereals, pulses and paddy are the principal crops. The district has around 360 revenue villages. A complete change in agricultural practices in many villages has been observed. Farmers indicated that the change has occurred after the technological dissemination of the KVK. Most of the change is in the cropping pattern resulting in high yield. Some success stories have been illustrated below.

Mr. Manivelu was an indebted farmer who was doing traditional agriculture during early days, now he is one of the big entrepreneurs-cum-farmers in the district. Now he is providing employment opportunity to 10-15 labourers daily through his nursery. He is producing high breed/cross-breed varieties of plants. People from all over the state and from other states (Kerala) are coming and purchasing plants from his nursery. During this season, he produced around one lakh Amla plants, out of 1 lakh these Amla plants, 80 thousand plants were sold out within period of two months. His nursery is spread over more than 5 acres of land on which varieties of nursery activities are done.

Mr. Munivelu in his nursery

Shri Karuppaiah is 36 year old Graduate and Diploma holder in Cooperatives (D. Coop).He is following integrated approach of farming. He got associated with the KVK in 2008 and started visiting KVK very frequently and attended various types of trainings at KVK.

He is doing the following activities simultaneously:

i) Mulberry Plants – two units and sending silkworm to Mysore in Karnataka
ii) Goat farm - Have 25 high breed goats (Thalaserry Brand of Kerala)
iii) More than 100 desi hens and cocks

iv) Maintaining more than 6 cows and selling milk daily to both government cooperative and private milk dairy

v) Producing organic fertilizers for his own purpose and selling to other farmers too

vi) Producing Asola – a cattle feed for milch animals

vii) Has 100 coconut trees – selling of coconut

viii) Cultivating onions, groundnut, paddy, maize, sugarcane, chappotta fruits.

Farmer Shri. Karuppaiah at his field

He is showing how to cliimb coconut tree.

He is the role model for many youngsters in the village. Seeing his success his younger brother left his service and joined him in agricultural activities.

Smt. Poongodi is a primary school dropout. Her husband was involved in forest produce collection for livelihood. After the intervention of KVK in the village (It is a ST dominated village in hilly region of the district) and seeing the success of fellow farmers, she also started farming activities and collecting medicinal plants' produce. She got training at KVK; she has been taken on exposure visit to nearby KVKs and visited farmers who got training for tailoring. Now she is doing cultivation, tailoring and also the collection of medicinal plants.

Smt. Poongodi standing in front of the drying plant installed with the help of technology disseminated by KVK very recently in her village. It is a privately made plant in which farmers can dry their medicinal plants, leaves, fruits etc. It is an organic way to get the things dry. Without losing its colour or features the products may get dry under this cottage which functions through solar system.

Shri Chinna Shankar, 67, has adopted the new technology disseminated by KVK for onion crop. He is now selling onions for seed purposes to other farmers and earning good remuneration from it. The use of chemical fertilizers is reduced by half and yield increased.

Farmer **Natchimuthu** is showing two qualities of beans. He is one of the non-beneficiaries of the KVK activities. He is briefing about the use of fertilizers and pesticides for better yield in beans. The smaller one could not get enough fertilizers. He wants the KVK staff to visit his farm.

In the photo one of the implements given by the state government to the farmers is shown. The implement is linked with drip irrigation system. Pesticides are mixed and placed in this container and it reaches the plants and crops without waste.

Smt. Periyakka (in the photo) an ST Farmer who is illiterate but looking after the entire farm process. She is living in one of the remote villages in the district. She gave her land for on-farm trail of the onion crop. Now she is cultivating the same variety.

General Observations and Suggestions

Dindigul, KVK is functioning under Gandhigram Rural Institute (Deemed University) of the Central Government. Due to the rural base location and courses and activities of the university, the KVK has reached many farmers in the district. Benefited farmers are following/adopting new techniques/practices and methods disseminated by the KVK. It was observed that, more farmers were being brought to this KVK for training and exposure visits. State Government Departments are arranging frequent training in collaboration with the KVK. All the benefited villages and farmers requested that the activities of the KVK should be continued and expanded.

The suggestions received during the interaction are:

- Reduction in budgetary allocations over the years is leading to reduction in the coverage of the KVK's activities.
- Delay in sanctioning of budgets leads to financial crunch in the KVK. Even salaries to the staff get delayed.
- There should be enough financial resources at KVK for better outreach.
- There is very limited allocation for farmers/trainees – Per day allocation/allowances is too meagre to manage.

Majority of the non-benefited farmers feel that the location of the KVK is the main reason for not accessing the services. KVK functionaries also do not cover many villages and therefore these villages are not getting KVK services. This category of farmers feels that KVK has to organize village level training progammes to cover more number of farmers.

TOLL FEE

Free entry at toll gates: The KVK vehicles are crossing bypasses frequently and have to make payments at toll gates, while all vehicles of other government departments are allowed free entry. A letter may be forwarded by the Ministry of Agriculture or Indian Council of Agricultural Research (ICAR) to the National Highway Authorities of India (NHAI) to make /allow free entry of KVK vehicles at all toll collection points in the country. It would not only save large amount of money but also time. This issue may be addressed by the ICAR.

4 KVK, Madurai

Madurai is one of the highly fertile districts of the state so far as agriculture is concerned. Availability of irrigation from Vaigai River and Periyar Dam has developed the agriculture in the district. This region is located in the southern agro-climatic zone of Tamil Nadu. The geographical extent of Madurai is 3,741.73 sq. km, contributing 2.9 per cent of the geographical area of the Tamil Nadu State. There are two revenue divisions and 13 blocks in the district. Madurai district is classified under the climatic zone of **Southern Plateau and Hill Region** in the country. The average annual rainfall of the district is 950 mm. The major portion of the rainfall is received during the north-east monsoon. The district is basically agrarian and agriculture is the main occupation.

Madurai, KVK was established as a farm training centre in 1971 and established as an ICAR-funded KVK in 2004. It is functioning under the Tamil Nadu Agriculture University, Coimbatore. Since its establishment the KVK is transferring various technologies relating to farming practices, use of fertilizers and pesticides, availability of implements and so on to the

farmers. While visiting the villages, huge difference in the method of cultivation, yield etc. has been observed in the villages covered by KVKs and that not covered by KVK.

The location of the Madurai KVK is another positive indicator for success of this KVK as it is located in rural area which is surrounded by many villages and farm areas. Many farmers are easily accessing the services of the KVK. The farmers living at a distant place find the KVK non-accessible and they remain non-beneficiaries although the KVK is providing its services in almost all 13 blocks but uncovered villages are still in large numbers due to limited mandates by KVKs.

State governments' extension activities are also available at grassroots level in each district to assist farmers, but their method and way of assistance differs with that of KVK. They are providing more inputs and assistance in terms of physical and monetary units, which can help the farmers for particular season or period. Whereas, the KVK is making the farmers to realize their potential, capabilities, quality of land, proper use of available resources and help them observe impact through demonstrations. Vast majority of technologies disseminated by the KVK in the district gave success to many farmers and still is under use in many parts of the district.

Success Stories: Shri Ganeshan is one of the most successful farmers at Sukkampatty village in Alanganallur Block of Madurai District. The 54 year old farmer is high school pass but now his children are working in Software Company and in government service. He has been the Best Farmer Award in Sapota Cultivation for 2012 in a function organized at Mumbai. He is one of the big farmers doing integrated farming. He is earning better income from Sapota and Coconut as compared with other farmers in the areasr. In addition, he is cultivating paddy, sugarcane and maize. He owns almost all agricultural machineries and equipments. He is one of the beneficiaries of the KVK. However, he is not happy with some of the activities of KVK as he feels that the activities are of formal nature to complete the target than making real benefit to famers. He wants more expertise from KVK from time to time.

Mr. Maruthanayagam and Mr. Karuppaiah from Valanthur in Chellampatty Block is also big farmers and award winners. They introduced modern methods of cultivation in paddy guided by KVK and got their yield almost doubled. Both of them have stopped using chemical fertilizers. They are producing bio-fertilizers and using it for their own purposes and selling it to other farmers. Both the farmers are getting assistance from State Government departments too because of their active participation in the programmes/trainings organized by them.

Smt. Easwari, 43, is a farm woman in Chokkadevanpatty in Chellampatty Block. She attended the training organised by the KVK and got chance to be a member for exposure visit to Coimbatore TNAU and some paddy fields. She is also a beneficiary of the KVK and adopted the systematic paddy cultivation technique. But during the second season she could not adopt it because labourers available in the villages are not familiar with the new system. She wants that KVK's faculty should visit the field and help labourers in cultivation using new technique.

Non-beneficiary farmer Periyakathan

Two non-beneficiary farmers who are cultivating with the same traditional method are not aware of KVK or any new technology. Neither the state government machinery nor KVK reached them to explain about the best practices. Nothing has changed in their farming practices. Both of them are small illiterate farmers who are not able to adopt any new methods on their own. There are large numbers of such marginal and small farmers who are left out by the service providers.

State Government Support and interventions: The state government officials are also involved in catering to the needs of farmers. Each block is managed by one Agricultural Development Officer. Under him, there are 1 or 2 Agricultural Officers, 8 to12 Assistant Agricultural Officers for procurement and distribution of Agricultural inputs, dissemination of technologies and demonstration of techniques for increasing the productivity and production of all crops. There are 1 to 4 Agricultural Extension Centres in each district to distribute agricultural inputs. It was observed from the survey that, the state government also contributed substantially to the development of agriculture and animal husbandry and horticulture in the state.

Procurement center in a Village

The picture shows the Direct Procurement Centre for Paddy in a Village, Nattarpatty in Chellampatty Block of Madurai District. This direct procurement centre is a temporary one which will function only in harvesting season in big villages. Such direct procurement centres has completely eradicated the intervention of middlemen and reduced the transport (loading and unloading) charges. This initiative has been taken by the state government. Farmers are using the service as it is available at their doorstep.

Observations and Suggestions

Madurai District is rich in agriculture due to availability of irrigation facilities. It is also one of the old KVKs established in the state. Because of widespread geographical area of the district KVK has not covered complete areas. However, the covered/benefited villages are showing the impact of the KVK's disseminated technologies in reducing drudgery and resulting in enhanced productivity. Farmers feel that they need more such activities of dissemination of technology and training. They also feel happy as services provided by KVK are free of cost.

The KVK officials stated that they are overloaded with more and more training programmes and activities as other institutions and departments also collaborate with them. This restricts them to make more field visits. Most of the trainings are organised in-house.

Farmers are of the opinion that due to the distance of the KVK and their busy schedule, they are not being able to visit KVK, therefore, the KVK staff should organize more village level meetings, demonstration camps, crop oriented on- farm trainings rather than organizing more training at the KVK campus.

There is lack of awareness about the KVK activities in the district. Media and other information technology should be used by the KVK for better coverage and awareness generation campaigns.

5 KVK, Coimbatore

This is one of the oldest KVK in the state which was established in 1979 and spread over 132 acres of land. The KVK is under the category of NGO under Avinashilingam University for Women at Coimbatore. Both the KVK and the university were founded by great educationist and social reformer, T.S. Avinashilingam, the first Education Minister in the Madras Province. The KVK is located far from the main city under the rule that KVK should be established 40km away from the city/district Capital. The district is spread over 4,722 sq. km (3,97,882.75 ha) and is one of the largest districts by geographical area in the state. The KVK is located near Karamadai, one of the 13 blocks in the district.

The highly fertile and irrigated parts of the state (Anamalai and Pollachi, Valparai blocks) are in this district. Coconut, Maize, Groundnut, Paddy, Sugarcane are the major crops in the district.

Grains like, Cholam, Ragi, Cumbu and grams are other supportive crops. A commendable proportion of the farmers are slowly changing into natural farming methods of cultivation. The following are some of the observations made during the visit in the district. The beneficiary farmers are expressed their satisfaction with the services of KVK

Location of the KVK: It is very difficult to reach the KVK even by car – farmers' access to KVK is restricted to nearby areas only. There is no direct public transport service to KVK from the district capital. From the district capital one has to change two buses to reach the KVK. The service of these buses is also not frequent.

Infrastructure: The KVK is spread over huge land area (132 acres). The infrastructure needs to be strengthened. Building, machinery and equipments are very old.

Linkages: The KVK has linkages with other institutions and establishments. The host organization, the Avinashilingam University was the founder organization of the SHGs movements in the State. The KVK is fully utilizing its linkages for the welfare of the farmers.

Budget: Budget is the major constraint in smooth functioning of the KVK. Limited financial allocation for demonstration and training is restricting the KVK's mobility in the widespread geographical area of the district. Especially, last year's (2014-15) sudden cut in the approved budget has stopped many activities at mid-way. Farmers are in the need of the services of KVK in many areas.

Human Resource: There is a need of more middle and lower staff at KVK to provide better extension services for the welfare of the farmers. Female staffs are more in number and they find it difficult without vehicle to visit farm lands in far-flung areas of the district.

Success Stories

Shri Kaliappan of Allapalayam Village in Annur Block, Coimbatore District, is one of the leading farmers in Integrating Farm System (IFS). He is using bio-gas since 1989 for cooking. He has 6 cows, more than 50 poultry, fish bond, goats, rabbits, and is producing bio-fertilizers, mulberry plants (three units), selling worms for producing bio-fertilizers, producing and selling bio-pesticides based on cow urines etc. He is cultivating coconut, banana, fodder crops, paddy, and maize in his land and getting income throughout the year. It was worthy to see the quality of worm he is producing and selling at Rs. 400 per kg to other fellow farmers. He has been given training by the KVK in IFS and given 15 Turkeys after the completion of training – he earned Rs. 1.50 lakh within a period of one year with the help of this turkeys. Another significant initiative observed is that, he is using the labourers of MGNREGS under a pilot scheme and adding Rs. 50 in addition to MGNREGS wages by employing them in his land.

Kaliappan (Allapalayam) progressive farmer

C. Ponmani in cloth for cotton plucking

Chenkutty is a Scheduled Tribe dominated village in Karamadai Block which is located in a very remote area. The KVK has made changes in the life of the peoples in the village. Vast majority of the people in the village have been provided training in one or the other area. The training on 'cotton plucking' was given to a group of young women and men in the village. This has helped them in grading cotton by quality at the time of plucking itself. The training has also reduced the time for cotton plucking. Another important intervention of the KVK had been in the value addition in banana cultivation. The trained group can remove the banana tree from the field and can earn minimum Rs.150 from each tree after processing. Earlier, after the yield, banana growers used to cut the tree and throw it away. The KVK provided training to a group of youth to prepare thread from the banana trunk and weaving it. Now the group is collecting trees from the growers for processing. The modifications in cultivation patterns have also been observed in lands of this village. Farmers in the villages started introducing the cotton crop after the intervention of KVK.

Thimmannagoundpudur (T.G. Pudur)

This village is a model village in the district for new initiatives. With the help of the KVK, farmers formed groups and then these groups came together as a Federation. Through the Federation they started a number of activities together for their welfare. The President of the Federation Shri B. Nandakumar appointed one Agric Educational background girl who passed out Diploma in Agriculture to help the farmers of the federation. She has been given a two-wheeler to visit all 11 villages under this federation to solve the farmer's problems. All farmers have been given phone number of this professional and vice-a-versa. She solves the problems of the farmers with the help of the KVK staff. She has been given a smart phone by the president to take the photographs of the crops with problems. The photographs are forwarded to KVK scientists for solution and replies are sent to the respective farmers. This system is working very well. This federation is now concentrating more on value addition and processing of the produce with the help of the KVK.

Mayilsamy, a farmer in **Kanavukkarai** Village in Annur Block of the district (Photo below) is one of the big farmers complaining about the disease in his papaya plant. He is cultivating Papaya at large scale. He complained about the disease in papaya tree to the KVK staff and even to the scientists at the Agricultural University at Coimbatore. However, the problem could not be solved and the problem is still continuing and affecting the yield. He has started using bio-fertilizers and pesticides, which has helped him to control the disease to a certain extent. He was of the view that research is needed to control various types of diseases in papaya.

Farmer Mayilsamy in front of normal tree.

The disease affected tree

General Observation and Suggestions

KVK, Coimbatore is located in a very remote place. Systematic cultivation, changing towards organic cultivation by using less fertilizer and pesticides, economic use of water – drip irrigation etc. have helped the farmers in the adopted villages. Suggestions received during discussions are as under:

- More staff at middle and lower level is needed for frequent visit of the field. The district area is spread over 100+ km and needs vast travel from one corner to other.
- Still there is large number of uncovered villages in the district.
- More frequent field visits are needed during the season.
- More financial resources to make field visits – vehicle and fuel budget should be increased.
- Training is required as per requirements of the farmers

6. KVK, Nilgiris

The Nilgiris district is a hilly district in the state with a very small geographical area (2,453 sq. km) and 56 revenue villages spread over 6 blocks. The districts' topography is rolling and steep. About 60 percentage of the cultivable land falls under the slopes ranging from 16 to 35 percentages. The Nilgiris district is basically a Horticulture District and the entire economy of the district depends upon horticulture crops like Potato, Cabbage, Carrot, Tea, Coffee, Spices and

Fruits. The district is very famous for its Tea Plantation. As pointed out, there is not much scope for agricultural development in this area.

The KVK is functioning under The United Planters' Association of South India (UPASI). The KVK is concentrating 70 percent of their activities on tea plantation farmers and remaining 30 percent for other crops. The tea plantation sector was in turmoil during the 1990s in the district, but now it has become profitable one to many farmers. The new technologies demonstrated by the KVK on tea plantation helped the farmers in many ways to make it profitable. Some of the big famers have introduced highly mechanised process of cultivation.

One of the beneficial interventions made by the KVK is grading of tea leaf according to its quality. Earlier, all leaves were put together and rates were fixed accordingly. Now there are four categories and each category is getting prices according to its quality. Post-harvest management practices of the KVK helped the farmers to classify and sell their product as per quality.

KVK Demonstration Field

Grade-wise rate for the week

General Observations

In general, it was observed that the services of the KVK have reached to the farmers in the district. The KVK is helping farmers to form group and getting bank loans. For instance, Federation of T. Manihatti Village in Ooty Block has received Rs. 75 lakhs of bank loan from a public sector bank without collateral because of the introduction of KVK. Another group from Unnathalai Village got 1.75 crores as loan from a public sector bank. This is a great and model

initiative by KVK. All these farmers' federation and groups are regularly repaying their dues to banks and periodically getting new loans.

Budget: The sudden cut in the approved budget for 2014-15 has affected the functioning of KVK in many ways. Some of the projects initiated were halted due to scarcity of funds. As the scope of the KVK is largely restricted with Tea Plantation, more budget allocation is needed to expand the services of the KVK such as putting more machinery for the use of farmers in villages, work as resource centre etc.

Faculty: The UPASI KVK staff is not getting their salary as per the ICAR sanctioned scale of pay. The host institution (UPASI) is not ready to pay the ICAR scale to the KVK staff. The host institution (UPASI) is running similar research institutions and paying consolidated salary. In order to maintain same level of payment, they are not accepting the ICAR pay structure. It is affecting the quality of the staff/services.

Suggestions

- Majority of the farmers feel that KVK should focus more on new technology and machineries to support farmers – as the land is degrading and labour shortage is increasing day by day.
- Machineries to wash carrot, potato are needed to help large number of farmers.
- More awareness generation activities by the KVK should be in place.
- Sprinklers to irrigate the land are also needed by many farmers. KVK support is needed in this connection.
- Farmers' Federation should be encouraged to open their own small tea processing factories. The KVK should be given authorization to arrange such factories through coordination with other agencies like Tea Board and other financial institutions.
- More exposure visits should be there in place through KVK to make positive impact of the functions of the KVK on farmers.
- There is not much awareness about the services of the Tea Board. The KVK should arrange awareness programmes to this effective manner
- Machineries and equipments should be provided to farmers through KVK at subsidized rates or on hire basis.

7. KVK, Salem

Salem KVK is functioning under the Tamil Nadu Agricultural University, Coimbatore since 1994. Salem district is one of the big districts by geographical area in the state with an area of 5,245 sq. km. The district is famous for its dairy activities. The state's second largest selling Arokya Milk Plant is located in the district. Almost every household in the in rural areas have cows/buffalos. The KVK has been given 10 senior research fellows (SRFs) to this KVK by the University for a period of one year under National Agriculture Development Scheme (NADP). This team has been asked to visit farmers in all the 20 blocks. It is a great support to the farmers in the district to utilize the services of the KVK.

The KVK has introduced 'Crop Doctor' software which can be operated both online and offline. Farmers can easily understand their problem and solve it by themselves. By clicking the symptoms they may understand whether it is a disease or a defect. They can get the solutions both in video and audio. This system is very popular in the district as well as in the state as a whole. The software is for all the major crops (Paddy, Coconut, Sugar Cane, Banana, and Ragi) and for animal husbandry – (Cows, Buffalos, Goats, Sheep and Poultry).

Salem KVKs' SMS, Agriculture Extension, Dr. Sriram along with few more experts at TNAU have developed the system.

Any farmer can simply operate the software and get solutions for their problems. The system can be developed in all the regional languages – ICAR has already taken a note on this for further expansion. Many private corporate companies are also in touch with the KVK for further collaboration and development of the software.

General Observations and Comments

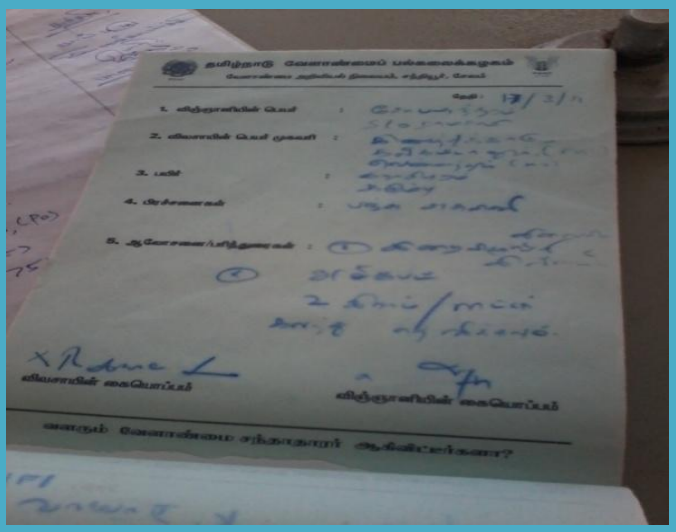
In addition to routine mandated activities, the Salem KVK has contributed in a number of other ways to farmers in the district as the KVK is under TNAU, Coimbatore, which is undertaking

many agri-tech research projects. The KVK is well equipped with all agri-machinery as compared to other KVKs' in the state.

Drip irrigation and mulching system are two technologies that have been passed on to farmers. State Departments are the major contributors to these technologies' inputs. Farmers are concentrating more on commercial crops in the district. There is crop diversification among farmers in the district. Every farmer has more than three crops at a time, that too commercial crop like tapioca, turmeric, water melon, coconut etc.

The KVK scientists are bringing their own projects from different sources and operating through KVK – this is one of the special features seen in this KVK. Three such projects of the individual scientists are there for the welfare of the farmers.

Another feature of the KVK is that, KVK SMSs are issuing a 'Prescription Sheet' to the visiting farmers in the KVK for any assistance. Farmers' name, address, crop for which assistance is required, problem and advice/recommendation of the SMS are mentioned in the sheet. This is a very good initiative.



Prescription Sheet of Salem KVK

- Reduction in budgetary allocations by ICAR over the years is leading to reduction in the coverage of KVK activities – more budget allocation is needed.
- There is huge scope for agriculture related industries in the district – more entrepreneurial development programmes may be provided through KVK for the willing farmers.
- Majority of the non-benefited farmers feel that the main reason for not accessing the services of KVK is: the KVK staff is not visiting their villages. Some farmers feel that KVK's location is a constraint in getting its services. Majority of the non-beneficiary farmers feels that the KVK has to organize village level training progammes to cover all the farmers.

8. KVK Erode, Gopichettipalayam

Erode KVK is functioning under NGO, Mysore Resettlement and Development Agency (MYRDA), which has its headquarters at Mysore in Karnataka. The KVK initially started functioning at Thalavadi, one of the interior hill blocks of the district, and recently shifted to Gopichettipalayam, a highly fertile part of the district. However, it is located in one corner of the district. Gopichettipalayam is one of the 12 blocks in the district and is famous for high breed paddy cultivation, Bananas, Coconut, sugar cane, millets etc. Erode district is very rich in agriculture and allied activities. Availability of irrigation is the main reason for more success in agriculture in the district. The district has widespread geographical area and the KVK could not cover the whole area of the district. However, as per the mandates, KVKs' extension activities have reached even interior parts of the district. The benefited/covered villages show the impact of KVK's disseminated technologies and improved practice.

Majority of the farmers in the district are adopting and preferring organic farming. Shri Nammalwar, an Organic Farm Expert has campaigned and started a movement (Vanagam) to popularize the organic farming in the district some 20 years ago in the district. This movement created great impact among farmers about the use of organic farming/practices. Simultaneously, the KVK also insisted the farmers for soil test and accordingly use of fertilizers to minimise the input costs. Both these interventions reduced the cost of cultivation which tempted farmers to opt for organic farming. Crop diseases are also controlled with organic methods. Now farmers are trying to minimise the use of fertilizers and pesticides. It is visible from the fact that there is large number of shops selling bio-products in the district. The KVK has arranged a shop in the town for selling organic products of the beneficiary farmers of the district. The shop has been rented by the KVK initially and now is being managed by the farmers. The shop has been a big hit and selling products worth Rs. 2.5 to 3 lakhs per month. Now, the KVK is aiming for similar shops at all the towns in the district. The President of the farmers' federation who is in charge of this shop is telling that, this shop was a great boost to many farmers to make value addition and processing of their products. At present, more than 200 farmers make organic products and sell

through this shop. This has encouraged direct sale of their products without the involvement of middlemen.

One of the most successful entrepreneur-cum-farmer is Mr. Uthirasamy from Anthiyur Block of the district. He is growing nursery for many crops and plants. He got training at the KVK and started this venture at small level which has now developed into many units in acres. As per the season he is preparing the nursery for watermelon, tapioca, banana, sugarcane, tomato etc. and is planting the unsold plants in his own land. Before the intervention of KVK he was an indebted farmer struggling for even a normal life. He is quite happy now about the timely guidance of the KVK and is expecting some more training activities to be conducted by the KVK.

Shri. Ramachandran from Ammapettai Union at Ramachipalayam Village has been trained under Integrated Farming Systems (IFS) by the KVK. He has (6) cows, goats, poultry, fishing pond, multi-cropping lands, etc. He gets income from farm activities throughout the year. Now he is able to give quality education to his children. He is also one of organic farmers who is producing organic manure for his own purpose and selling to other farmers as well. His banana variety (red coloured one) has very good yield and fetch good income for him.

Latest experiment of the KVK is in colloboration with National Institute of Plant Health Management (NIPHM), Hyderabad, on paddy – not using any fertilisers and pesticides – is under trail. Ninety percent of the crop is perfect as per the expected growth. On all the four sides and at middle line different vegetalbes and flower plants are planted to attaract the insects which normally used to attract/attack the paddy crop. The farmer is extreamly happy that he doesn't have to incur any expenses for his land. Earlier, he had to apply chemical fertilizers eight to ten times starting from the day one.

Paddy with flower plantation

Farmer in his land of trial

Observations and Suggestions

- The KVK has been awarded as the Best KVK at the national level for its performance in 2008. Some of the KVK's beneficiary farmers are also National Award winners. Fertilizer consumptions are reduced by 43 percent over the past five years in the district
- The KVK is the resource centre for training to Water Shed Management for Tamil Nadu.
- Huge delays in approving and sanction of the budget is hampering the performance of the day-to-day activities.
- Both the financial and human resources are to be strengthened to make KVK more effective.
- Farmers are expecting more subsidized inputs from the KVK because of its quality and positive impacts – KVK is providing some inputs at subsidized rates to very few farmers – more farmers are expecting this service of input provision.
- Mandatory activities should reach to more farmers/villages each year by increasing its volume.
- SMSs and other KVKs staff should be encouraged through provision of minimum facilities and perks. There is difference in pay allowances and promotional possibilities of the SMSs of ICAR/University KVK and those of Private/NGO KVKs – every SMS should be equally treated as the mandates are uniform for all KVKs.

9. KVK, Tuticorin (Thoothukudi)

The district is known as the Pearl City. The total geographical area of the district is 4,63,601 ha of which net area sown is 1,78,080 ha. Soil type is red, black and sandy loam. The district consists of eight talukas, twelve blocks and 480 revenue villages. The district depends mainly on North-East monsoon rains.

Paddy, sorghum, peal millet, black gram, green gram, groundnut, sunflower, chilli and coconut are the major crops in the area. Paddy, banana, coconut are produced in river basin. Drumstick and vegetables are garden-land crops. Major rain-fed crops are pulses and chillies. Considerable number of animal population forms livelihood of majority of farmers.

About the KVK

The KVK was established in 1995 and is located in Thoothukudi. It is functioning under NGO, Social Change and Development (SCAD). Like other KVKs, this KVK is involved in various mandated activities such as conducting frontline demonstrations for mass adoption, on-farm trials, supplying quality inputs to needy farmers etc. This KVK is working for bringing the changes towards considering farming as a business-promotion for Agri-preneurs, The SMSs facilitate formation of farmers' federation, group marketing association etc.

The study team has visited a number of villages as well as organized focus group discussions at village level and at KVK level. Interactions have been made with farmers of Kootampuli, Manakarai, Mudivaithanendal, Pandiyapuram, Sakkammalpuram, Maravanmadam,

Keela Mudiman, Sawerpuram, Kalvilai, Thoppur and Meghalapuram. The interaction covered both intervention- as well as non-intervention villages.

The KVK is following a holistic approach for development giving importance to small and marginal farmers with landholdings less than five acres. About 90 per cent demonstrations have been reported to be conducted by this KVK on the land of small and marginal farmers. Besides mandated activities, a number of new initiatives have been taken by this KVK, for instance, it is networking with various SHGs. It has a soil test laboratory and it also conducts training programmes for farmers on how to conduct soil test at village level. A small kit is also provided to the trained people. In this way they are creating jobs at local level. Farmers' base line data is also under preparation to have a better outreach in future. The KVK is collaborating with various other organizations that are functioning for the benefit of farmers and doing technology transfer. For example, there are 26 farmers' clubs which are functioning in collaboration with NABARD. The KVK is collaborating with these clubs for imparting technology. The ATMA is also associated with this KVK.

Some specific technologies were imparted to farmers and feedback shows their success. For instance, 450 farmers were provided technology to rear honeybee and 50 per cent farmers have already adopted the technology. Technology for disease control in banana and cultivation of Marigold with banana was suggested to farmers. About 50 to 60 per cent of the farmers have adopted this technology. Similarly in the field of livestock, the KVK provided information about mineral feeding to goats. But farmers were of the view that more and more training are needed for better health, hygiene and a keep of livestock. Earlier, farmers were unable to differentiate between pest attack and diseases and were applying the same solution in both the cases which did not help them. After the KVK intervention they have been able to understand the variation. It has benefited them as well as there is a spillover effect on fellow farmers. The farmers reported that earlier birds use to be taken to hospital for vaccination which is at a distance. The KVK taught the technology of vaccination which has helped the farmers a lot. They were of the opinion that the youth should be provided training on how to vaccinate birds. This will provide employment to the youth in the villages itself. The KVK has helped farmers to grow trees in cultivable wastelands. Farmers are growing casuarina trees and amla trees which is fetching good price. Some other farmers have been helped in using machinery in green gram and black gram cultivation, weeding operation through tractor drawn weeder, soil test report and recommendations on crop cultivation, organic farming system, fodder production, milking machine, enriched bio-char, bunch cover, IIHR Banana special, drip irrigation and fertigation of new high-yielding varieties through pole vegetable cultivation. Introduction ofTRI 3 Paddy variety for saline soils, prevention of mastitis disease in cows, salt lick for animal body weight gain, revolving stool for milking the cows are among the interventions provided by the KVK.

One of the major achievements of the KVK is coconut tree climbing training. Earlier, climbers used to charge Rs.50 to Rs.60 per tree to cut the coconut. With the new device one can climb 30 to 40 trees a day and even females can use this appliance. The KVK has provided training in operation of this device to a number of female farmers.

The KVK is functioning as a resource centre, farmers hire implements whenever needed. For instance, farmers have taken drum seeder to sow paddy.

Some of the farmers after learning technology from KVK are doing refinements as per their needs. The mulching has been given to the farmers from KVK. This technology requires purchase of sheet. One of the progressive farmers is doing some refinement and using waste of agriculture for mulching instead of purchasing sheet. In case he gets success he will tell other farmers as well as KVK for this refinement. This will reduce the cost and the agriculture waste will be used as well. The agriculture waste will also contain the moist.

Interactions with various Stakeholders

An FGD was organized in the premises of the KVK which was attended by about 20 persons including farmers from intervention- as well non-intervention villages, experts from government departments, representatives of NGOs, the KVK team, and progressive farmers. The expert from the government department was to the view that collaboration with KVK has helped in organizing rural veterinary camps resulting in better health of livestock and poultry. He stated that assistance from ICAR can be explored so that KVK could purchase vaccines to prevent commonly occurring diseases in livestock. This will help farmers to a large extent. The representatives from reliance foundation stated that need-based training programmes are conducted with the help of KVK. The KVK is providing help in content preparation, giving farmers' contact numbers and other assistance. With the help of the contact numbers provided by the KVK, the foundation has been able to send SMSs for various informations. The problems related to agriculture and horticulture is looked after through phone call which is toll free. The KVK can also provide such toll free advisory services to the farmers.

The KVK is promoting farmers' innovations too. A farmer had innovated one sprayer which reduced time for spray. The farmer who has innovated this sprayer had his farm near the road side, so, many other farmers saw it and adopted this technology. During interactions with farmers it was felt that such innovations need to be brought to the notice of ICAR and should be given wider publicity.

The KVK has laid special emphasis on agricultural processing and/or value addition. They also conduct need-based skill trainings to the farmers, farm women, rural youth and Extension functionaries. In addition to this, the KVK provided various supports to farmers for implementing new technologies such as soil and water testing service to recommend correct doses of fertilizers, production and sale of planting materials, production and sale of bio-fertilizers like Azophos, Rhizophos at subsidized rates.

A team visited the KVK and the villages adopted by the KVK and also non-intervention villages in the district. It was brought to the notice that PRA exercise is done for selection of farmers and execution of OFT and FLD.

Visit to Intervention Village

The KVK noticed the potential of underutilized ponds for fish production and provided improved fish production technologies to increase production in common ponds in the underutilized village. This inland fish culture demonstration programme has played a significant role in improving the economic status of the villages and supply of protein to village community people at low cost.

Training cum Demonstration on Cage system of improved backyard poultry was provided. Regular veterinary camps and service through village link work couples were organized to reduce mortality in livestock and poultry.

Promotions of minor millets through Nutrimix and through nutrition demonstration were also undertaken. The KVK undertakes field diagnostic visits as and when necessary to solve field problems on the spot. Regular farm advices through newspapers, magazines, contact farmers, live TV shows, TV telecasts, radio talks etc. are provided to farmers. For refinement of technologies to suit the condition, technology debates are undertaken.

The KVK is linking farmers with the other technology providers such as Tamil Nadu Agriculture University; National Research Centers of ICAR. Exposure visits for the farmers are also organized. The KVK provides training for promoting entrepreneurship also.

Socio Economic Empowerment of Rural Women through KVK Intervention

The technology delivered by KVK is suitable to women farmers. Many women have started SHGs. The technology is transferred mostly through women contact farmers who are mainly volunteers.

Some of the technology transferred, which are more suited to women, through KVK are drudgery reduction tools like paddy drum seeder, environment fit stove, improved charcoal sarai cooker, revolving milking stool, vegetable preservator etc.

Also, technology on value addition to fruits & vegetables, millets, mushroom, baby corn, masala powder preparation etc. were delivered specially for the women farmers. For empowerment of women the KVK is providing training to women and helping them to form SHGs which help in drudgery reduction, economic upliftment and participation of women in decision making process.

It was observed that in the intervention villages cattle are deficient in minerals. With the intervention of KVK milk production increased up to 500 ml. per day. Clean milk production technology helped in avoiding the entrance of microbes.

Success Story

Mr. R.Ilango created a model for integrated farming:

Mr. R. Ilango, a botony graduate, living in Sawyerpuram village near Thoothukudi created a model for integrated farming system. He cultivates crop like banana, paddy, vegetables, babycorn and green fodder in 3-acre land completely under organic method using drip and fertigation system. A rich organic content built up in soil made it possible because of continuous addition of crop residues and cowdung. He never forgets to add panchagavya once in ten days that is prepared on his farm premises using cowdung, urine, ghee, fruit waste, palm jaggaery and sprouted pulse. He maintains 10 cattle, out of which six are in milking at any time and he sells milk at his doorstep at the rate of Rs.45 a litre directly to his customers when others are selling at Rs.25 a litre. He converts the cowdung into biogas using a portable balloon model and cooks food every day for his family using biogas. With this biogas unit he could save the purchase of 9 LPG cylinders in the last one year. He converts the cowdung into vermi-compost and find it easier for transport to the farm and application to the field. He also maintains 10 goats, 50 backyard poultry , 2 bee hives, 6 rabbits, 2 geese and a small fruit orchard. He said that his banana crop matures early , evenly and make it possible to have two ratoon crops in two years, while his counterparts who use inorganic fertilizers alone can have only one ratoon crop in 2 years as their banana bunches are not maturing uniformly and takes 12 months for one crop. He has proved that his banana yield is almost the double from his neighbours. His crop remains healthy and gives good yield though at some time faces the problem of pest and diseases. His healthy plants help him to overcome this problem financially. Twelve years ago he was an inorganic fertilizer trader who won awards for his efforts by the fertilizer companies. But because of the continuous loss from his farm he discontinued the usage of inorganic fertilizers and turned towards partial organic farming because of the advice from the KVK and within 2 years he has been able to convert his farm into completely organic one.

The study team visited non-intervention villages like Thoppur. The village will found to be modernized and rich farmers stated that they are happy with the traditional method of cultivation and are seldom in touch with the Agriculture department personnel to solve their problems. In case of need they go to pesticide and fertilizer dealers to solve their problem. They also get seeds from shops which have increased the yield and income. With the use of machinery

the labour problem has also reduced. The farmers from the village of Meghanapuram stated that since the new technology is costly they are following the traditional method of cultivation. Still their yield has increased because of use of machinery and good quality seeds.

Observation and suggestions

During the interaction with various stakeholders, the following observations were made for which suggestions are indicated:

- The KVK should play a pro-active role in providing accessibility to various agricultural inputs as private dealers provide inputs at a higher rate. Moreover, the KVK should produce bio-products to control various pests and diseases, for example, some bio-product is needed to control the coconut pests (Rhinocerous and red palm weevil manace). There is also a need to produce and distribute bio-inputs like Baevaria and Metarhizium.
- Monthly farmers' meetings should be organized regularly to have a continued interaction and communication.
- Training is needed for cultivation of herbal plants, its processing and export procedures. It was also brought to the notice of the study team that training should be provided to farmers in various areas during the sowing and harvesting season.
- The farmers were of the view that the producer of various products has a right to fix the price for his production. But this is not practiced in the case of farmers. The farmers should be given the right to fix the price for their produce.
- Since the farmers in the district are educated, there is a need to bring out a book with technical details of various technologies, besides the address of input dealers, buyers, and other market information for selling the product.
- Agriculture is becoming mechanized. Training by the KVK is needed on how to operate various machines, their upkeep and minor repairs. The youth from the villages can also be provided training for repair of various agricultural implements. This will provide jobs to the youth and also help the farmers to get their machinery repaired locally.
- Since soil analysis is extremely important for appropriate application of manure, the KVK should organize camps in various villages from time to time for soil testing.
- Huge cultivable wasteland is available in the district. The KVK can select some villages every year and use such land for cultivation.
- It was observed that the KVK is providing various services with human touch approach which has been found very successful. There is a need to strengthen the KVK in terms of resources. It has also been seen that while agents from various industries visit villages for spray, etc. for disease control they do not tell anything about the technology. The KVK's role in this connection can be extremely beneficial. It was also stated that the district needs more than one KVK and it was suggested that one KVK in each block is essential.

- Information about the new varieties, new technologies, sowing time, etc. should be provided by the KVK using electronic/paper media.

10. KVK, Kanyakumari

Kanyakumari is the southernmost district of Tamil Nadu. It is bound by Tirunelveli District on the northern and the eastern side. On the west and north-west it is bound by the State of Kerala. Gulf of Mannar is on the south-eastern boundary. On the south and south-west, the boundaries of the district are the Indian Ocean and Arabian Sea. Total area of the district is 1,672 sq.km and the population is 16,76034. It occupies 1.29 percent of the total area of Tamil Nadu. The district consists of four talukas, nine blocks and 81 villages. It ranks first in literacy among other districts of the state.

More than 95 percent of the operational holdings are marginal (below I hectare), 2.09 percent are small, and only 0.77 percent holdings constitute large farms. About 2.45 percent of the workers in the district are cultivators (http://kvk-kumari.org/districtprofile). The district has rainfall, both during the south-west and the north-east monsoons. It has a favourable agro-climatic condition which is suitable for growing a number of crops like paddy, tapioca, banana, pulses, coconut, vegetables, ginger and rubber. Among these crops paddy and coconut are the major crops cultivated in the district and occupy a total area of 17,500 and 24,000 hectares respectively. Soil and climatic conditions prevailing in this region are highly suited for cultivation of these crops.

About the KVK

KVK, Kanyakumari was established in 2006 in Pechiparai and was shifted to Tripurisaram village, 6 kilometers away from Nagercoil only a year back. It is functioning under Tamil Nadu Agricultural University and caters to the needs of the farmers of the district by imparting village level training and demonstrations and improved farming technologies and innovations.

The team visited the KVK and some adopted and non-adopted villages and interacted with farmers, programme coordinators and SMSs. Discussions were also conducted with the State Department officials, NGOs, farmers and other experts who are involved in technology transfer. FGDs were organized at village level in the KVK and in the university department.

It was observed that the KVK works in coordination with state department of agriculture. Collaborative workshops are organized by the state agriculture department every month. Joint field visits are also arranged in collaboration to the villages by the KVK and state departments. Farmers of the district are generally educated. The district has 9 blocks and 181 revenue villages.

The team was informed that the KVK has touched all the villages either through training and demonstrations or through SMS and radio programmes.

During the discussion, it was observed that farmers are well aware about the activities of KVK. Cluster model is adopted for selection of the villages for intervention as is in other KVKs. Generally, 5 clusters are chosen with 2-3 villages in each cluster. One of the major problems the district faces is the problem of acidic soil. Therefore, soil testing facility is provided to farmers by the KVK.

There are farmers' association, paddy association, coconut association and the KVK has regular interaction with these groups for imparting technology. There are farmers' field schools and the KVK conducts training on value addition of fruits and vegetables. Awareness has been created about coconut root wilt disease among the farmers and extension functionaries through training and demonstrations in affected areas. Farmers' needs are assessed through field visits, OFT and call from farmers. Monthly workshops are organized at the KVK. The KVK is providing training in using green manure but these are less productive since farmers are reluctant to use it. Since agriculture is the main source of income, farmers don't want to take risk. It was observed that large farmers accept new technology immediately.

During the interaction with farmers it was reported that while agriculture is the main activity for the majority of farmers, there are other economic activities in the district in which family members of farmers are involved. The activities/jobs in which persons work are tailoring, tuitions, night watchman, MNREGS, driving, provisional stores, stationary shop etc. Farmers told about various problems that were being faced by them relating to agriculture and technology. They said for instance that due to water scarcity for irrigation, rain water harvesting is very much required. Silt is to be transferred to farmers of this district while government is selling silt to farmers of other areas. The silt water is down, therefore, de-silting is necessary in which technical assistance is required from the KVK.

Farmers were of the opinion that technology transfer should be need based and new technologies that are successful in other states/districts should also be imparted in this district. For example, water weed is a problem. The State of Kerala is applying some advance technology to remove it. The same technology is needed in this district. Similarly, they also need an integrated approach for pest control and soil disease management as sometimes they are not able to differentiate between pest attacks and soil diseases. It was reported that mechanization is taking place in agriculture. Cooperative societies and the state government are helping in mechanization while big farmers have their own implements. Other farmers are hiring the machines and equipments. This has reduced manual hard work and helped farmers in reduction of time and manual labour. Sometimes farmers want to purchase various machines and equipments as these are not accessible on rent during the season. But neither have they had

information about the availability of these, nor can they afford. Either the KVK should be developed as a resource centre or government should provide subsidy on mechanization. It was also indicated that big farmers get most of the benefits from extension services and they also accept the technology transferred immediately. One of the reasons behind this phenomenon is that big farmers have more land and in one part of the land they implement new technology and after seeing the results they expend. On the other hand, small farmers have limited land, and therefore, they do not want to take risk. They follow the technology only after seeing the success at other places. Farmers opined that exposure visits are needed in northern states of the country.

Farmers were also facing the problem of low price for their products. While the cost of production has increased, they do not get adequate price for their produce. Some items are perishable, and therefore, they have to sell the produce at low price. The KVK and government intervention is needed for village level procurement to facilitate marketing of the produce.

It emerged during the discussion that certified seeds are distributed by the state departments while KVK is contributing only in popularizing new variety of seeds. New variety of seeds needs to be made available by the KVK.

Technology Transfer

A number of technologies have been transferred to farmers which have resulted in improved yields. New varieties of paddy like ASD16, TPS3& 5 had been successful. These are short duration varieties and 20 per cent less area is needed. This has helped farmers in diversifying their crop. Banana varieties are there and to develop immune system of trees, the use of spray which was suggested by the KVK was immediately adopted. Some other successful technologies are coconut tonic, coconut climbing device, paddy mechanical transplant, etc. The demonstration in nursery and cut-flower production had been beneficial for the farmers. Dolomite application for paddy in acid soil to reclaim the soil acidity, introduction of high yielding variety of ginger (Varadha), inter-cropping in coconut etc. are some other successful technologies which have helped in improving the yield as well as in generation of employment. Introduction of mechanical coconut harvesting device became very popular as it helped in reduction of drudgery and less time taken in coconut harvesting.

Nursery and cut-flower production – a profitable venture for unemployed rural youth

The vocational training on nursery and cut-lower production has motivated the SHGs and the rural youth to start their own ventures. As a result of this, two SHGs and four individuals started their own production units at their respective places. Being equipped with the nursery skills by the training programmes, the SHG (Agastiar Sanjeevi vana muligai group) started a nursery unit in an area of 40 cent with buyback arrangement of their produce during 2005-06. They are concentrating mainly on the production of medicinal plants. They are producing the nursery plants on order basis and getting approximately a monthly income of Rs. 2,200. Apart from producing nursery plants they are maintaining more than 120 high value medicinal and ornamental plants.

Similarly, Surya Self Help Group of Pechiparai has also started rubber nursery during 2006-07 in an area of 16 cents and earning Rs. 16, 000 per year. After attending 21 days' training programme during 2005-06, Mr. Sasikumar Sarode Thuckalay has started a nursery unit (Indira nursery gardens) for production of ornamental plants, Casuraina, Jasmine and cut-flowers like heliconia and orchids. Apart from nursery plants he is also producing cut-flowers like heliconia, orchids and anthurium and earning an average of Rs. 7,500 per month. After attending 15 days' training programme during 2006-07, Mr. C. Sugumaran, a tribal farmer from Orunooranvayal village has started a nursery unit for production of rubber and medicinal plants. He is earning an average of Rs. 38,000 to Rs. 52,000 per year. After attending 10 days' training programme during 2009-10, Thirumathi. L.S. Little flower Puthukadai has started a nursery-cum-cut flower unit in an area of 75 cents at Karakonam with some choice varieties of heliconia, orchids and anthurium, which are preferred mainly for export market. Mr. Vijayakumar Azhagiamandapam attended 10 days of nursery training during 2010-11 and now he has started a nursery at Azhagiamandapam (Deepam nursery gardens) in an area of 30 cents and is earning Rs. 5,200 per month.

Some technologies could not have positive impact as expected. For instance, CO-45 rice variety is slender type while farmers want thick variety; similarly, a variety of black gram (VAM3) is susceptible to yellow virus diseases. Power weeder in paddy is not functioning properly.

Some new variety of bottle gourd guard could not fetch good market price. More research is required to bring out varieties suited to the region. The CR1009 rice variety is although a high-yield variety but it is a long duration variety, therefore, farmers do not want to adopt it. In hydrophonix technology more advancement is needed.

Challenges

While transfer of technology is beneficial and also in demand, there are a number of challenges that are being faced by the KVK. One of the major challenges faced by the KVK was that there is no mechanism of transfer of new research to KVK. It was brought to the notice of the team that the scientists/SMSs have to keep track of the new technology brought out by universities/research centers. This can be done through conferences/seminars and internet. There should be a uniform technology transfer system from lab to KVKs and that too in fast mode. By the time the KVK get to know about the new technology and make a plan to transfer it further to

farmers at field level, it is sometimes either obsolete or farmers are already aware of it through other sources.

The soil in the district is acidic. Mitigating the ill-effects by adding suitable organic/inorganic amendment is not practiced much by the farmers. Only few farmers (< 15 %) are applying the soil test based balanced application of fertilizers. They take advice from the shops and put more and more fertilizers etc. which is spoiling the soil health.

The KVK is only disseminating/informing the new technology such as new variety of seeds, implements and fertilizers but cannot make these available to the farmers. This is a major hindrance in adoption of the technology on the part of farmers. Farmers do not have accessibility or resources to reach far-off places to purchase the new technology. Small farmers are not ready to accept the new technology due to fear of crop failure.

Low stipend given to farmers for training discourages farmers in participating in the training as the KVK is located at the remote place and transportation cost is high. Most of the trainings organized by the KVK are not pre-planned and farmers are not aware of it. Those farmers come for training, who may not need it. Proper selection of farmers for training according to their need is a major challenge.

Sometimes consumers' interest and taste varies from state to state, for instance, production of corn and basmati rice failed in this district as consumers did not like it and the farmers could not sell it outside. Therefore, while transferring the technology, the tradition, culture and demand from the society should be taken care of.

Observations, Suggestions and Action Points

- While technology transfer has become successful in the areas of agriculture and horticulture, the district has great potential in fisheries, veterinary and development of poultry. The KVK should take initiative in these areas and initiate technology transfer at village level.
- The KVK is in direct contact with farmers and works as a bridge between the university and extension work. More demonstrations are needed at farmers' fields from KVK.
- There is a need for a clear-cut policy for product procurement prices.
- An all-India networking of KVKs is essential to make them effective. This would help in understanding the activities performed by various KVKs, problems therein and the coping strategies. It would provide an experience sharing platform and a forum for learning lessons from each other.
- Soil testing is a complicated process. More sophisticated equipments are needed to reduce time of testing and provide instant results to farmers.

- A multi-faceted approach is needed and the KVK should take lead in mass-scale training in value addition and its forward linkages. Flower cultivation is also in demand in the district.
- Since KVKs are following cluster approach, it is proposed that from each block some villages should be adopted to increase the activities of KVKs and for faster transfer of technology. Till now, the transfer of technology remains confined to a couple of blocks/villages only.
- Exposure visits to the places should be planned where latest technology has been enacted. Farmers are demanding the technology of tissue culture and agriculture in poly-houses. Exposure visits are needed as per the needs of the farmers. Proper selection of farmers for imparting training is necessary and trainings should be planned in advance.
- The KVKs is providing training but no follow-up action or feedback loops are in place. This is true in the case of other KVKs as well.
- Training is also needed in operation of various machines and their maintenance.
- Farmers are also demanding training in marketing and exports.

General Observation and Suggestions: The KVK in Tamil Nadu

The KVK has made visible changes in farm practices in the state. It has disseminated technologies and improved practices of farming in the covered villages. Farmers are also very much eager to learn and show interest in KVK's activities. The KVK activities have reached to a large number of farmers/farm women, unemployed youth.

There is a need for expansion of such activities and better outreach. Farmers also expect support in terms of inputs from the KVK. Assistance from KVK in market linkages is also needed.