Proceedings of 7th National Conference on Krishi Vigyan Kendra

Integrating Technologies and Best Practices

20–22 November, 2012

Division of Agricultural Extension
Indian Council of Agricultural Research
New Delhi 110 012
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Agriculture continues to remain a major sector of the Indian economy as it still contributes significantly to national GDP and provides employment to larger rural population. Technological progress in agriculture is crucial for the overall economic development of the country. But, at the same time Indian agriculture is facing serious challenges because of ever-increasing population, limited land and water availability, degradation of natural resources and climatic changes. New opportunities and threats for trade in international markets have further added new challenges for Indian farmers. In this scenario, technologies and best practices continue to play a major role in achieving sustainable production which can effectively address both challenges and opportunities in agriculture sector. The KVKs act as knowledge and resource centres for application of location specific technologies and best practices. These Kendras will definitely play a crucial role in the growth of agricultural sector in the future. The strong network of KVKs in the country has done commendable job in disseminating the farm technologies and best practices across the country.

Since 2005, the National Conference on KVK provides an excellent platform to KVKs in sharing of knowledge, technologies, best practices and experiences. In this regard the major theme of 7th Conference was appropriate and relevant. The action points emerged from the deliberations and documented in these proceeding of the Conference will guide all stakeholders for promoting such practices on wider scale. At the same time, development professionals and extension workers can use them directly in almost similar situations.

I congratulate the Indian Council of Agricultural Research and Punjab Agricultural University, Ludhiana for successfully holding the 7th National Conference. I am sure that KVKs would effectively work on the recommendations of the conference for further upliftment of farming community.
Since the era of green revolution, technology has been the major driving force for increasing agricultural productivity and promoting agricultural development in India. In the past, the focus was to increase production, productivity and profits, whereas now the emphasis is on achieving those aims in a more sustainable way.

With the hard work of farmers and technological support of National Agricultural Research and Extension Systems, the country has achieved tremendous progress in all sectors of agriculture. However, at the same time, many challenges such as changing dietary habits of people, fragmentation and decreasing size of land holdings, climate change and deteriorating natural resource base are posing serious threats to Indian agriculture. Krishi Vigyan Kendras (KVKs) located at the district level are dealing with these issues at micro level. I appreciate the role played by KVKs in application of location specific technologies under various agro-eco systems across the country.

Though new technologies are vital for the growth of agriculture sector, however, technology per se cannot be problem solving unless it is complementary with farmers’ needs, resource base and socio-psychological context. Thus, integration of technologies in different farming systems is of paramount importance and need of the hour. The KVK system has to gear itself for integration of technologies and best practices in participatory mode with farmers for boosting their income and improving their livelihood.

I am glad to observe that the 7th National Conference on KVK held at Punjab Agricultural University, Ludhiana from 20 to 22 November, 2012 on the theme “Integrating Technologies and Best Practices” was a befitting event for sensitizing the KVKs and other stakeholders in this regard.

I congratulate the Indian Council of Agricultural Research for bringing out the Conference proceedings in an excellent manner. It is hoped that the recommendations of the Conference will give new directions to the programmes and activities of KVKs.

I wish continued success to the KVK movement in the country.

18th October, 2013

(Charan Das Mahant)
Agriculture is major sector of Indian economy with considerable share in GDP and larger population of the country still depends upon this sector for livelihood. The National Agricultural Research System including KVKs is generating and applying the technologies for improving livelihood security of farm families in the country. Adoption of such technologies in fact has witnessed the green revolution in the country and made India self sufficient in terms of food grain production. Still much more has to be done for food and nutritional security of the ever burgeoning population on sustainable basis. A number of natural and human made challenges are also posing threats for achieving sustainable production in agriculture and allied sectors resulting in low per capita income in rural areas. Integration of technologies and best farm practices need to be taken up on large scale to encounter such emerging scenario.

The network of KVKs is involved in developing location specific technology modules under different production systems and agro ecologies of the country for the benefit of farming community. Over the years, the efforts of KVKs have been appreciated by all stakeholders. In order to provide technological backstopping to the KVK system on Integrating Technologies and Best Practices, the 7th National Conference was organized at Punjab Agricultural University, Ludhiana on 20-22 November, 2012. Now, KVKs need to look on the recommendations emerged out of these deliberations and upscale the best practices among the farming community, wherever applicable.

We are highly grateful to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar Ji for delivering a thought provoking inaugural address and Hon’ble Union Minister of State for Agriculture and Food Processing Industries, Dr. Charan Das Mahant Ji for his special address during the inaugural session of the Conference. I congratulate the organizers of the conference and thank all the speakers for their specialized presentations in the technical sessions and enriching the discussions. I also thank all the Chairs, Co-Chairs, Panelists and participants for actively focusing on the issues and deliberations around the main theme of Conference and in the technology exhibition as well.

Foreword
I appreciate Dr. K.D. Kokate, DDG (Agricultural Extension), Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana and Dr. A. M. Narula, Zonal Project Director, Zone-I and their teams for excellent arrangement and successful conduct of the Conference and for bringing out the proceedings.

(S. AYYAPPAN)
Sustainable development can not be achieved without a major contribution from agriculture and allied sectors. The issue of growth in agriculture has assumed global concern in view of meeting the Millennium Development Goals of producing enough food for a rapidly growing world population whilst maintaining the world’s fragile natural resources. Here comes the role of such agricultural technologies which could be integrated into the existing farming systems under different agro-ecological situations for boosting production of various commodities. The process of integration of technologies and best practices involve many tasks including agro-eco system analysis for identification of problems and deciding objectives and goal for using technology to solve those problems; acquisition of the technologies keeping in view whether the technology will meet the need and expectation of farmers; implementation of the technology integration in view of the factors involved in ‘making it work’ and finally integration in to the farming system on sustainable basis.

In order to address all these issues, the 7th National Conference on KVK was organized at Punjab Agricultural University, Ludhiana on 20-22 November, 2012 with focus on Integrating Technologies and Best Practices. The rationale behind selecting this theme was to sensitize KVKs and facilitate them to reiterate their larger commitment for integration of technologies leading to its assimilation in the normal process of production activities. After all the technology integration process provides a set place for the technology among all elements of production system and many a time requires certain changes in other related elements of the system.

It is with this context the, deliberations of the Conference were focused on eight sub themes viz. (i) Convergence and linkages between KVK-ATMA programmes- best successful cases of field extension, (ii) KVK's best and technologies for higher production, value addition and improved livelihood, (iv) Facilitating KVKs in management, administrative & financial matters, (v) Farm innovations and best practices developed by farmers, (vi) ICT mediated best practices in knowledge empowerment of farmers, (vii) Integration of best practices and technologies under NICRA-project (viii) Technological backstopping and harnessing synergy of working in partnership mode for higher productivity wherein agricultural scientists, innovative farmers and other stakeholders shared their knowledge and experiences on various aspects of agriculture and allied sectors.

Preface
Besides, one special session on Programming mind for success and unleashing human potential was also organized. In addition, a Technology Exhibition cum Innovation Market event was also organized on the sideline of the Conference wherein technology stalls were put up by KVKs, Agricultural Universities, ICAR Institutes, farm women self help groups, innovative farmers and other stakeholders.

I express my highest regard and indebtedness to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar Saheb for providing leadership and delivering the inaugural address. I am also thankful to Dr. Charan Das Mahant ji, Hon’ble Union Minister of State for Agriculture and Food Processing Industries for his graceful presence and addressing the delegates. I am highly obliged to Dr. S. Ayyappan, Secretary DARE and Director General, ICAR for his constant encouragement, support and valuable guidance for holding the Conference and thought provoking opening remarks during inaugural session and chairing the session on Facilitating KVKs in management, administrative & financial matters. I am also grateful to Dr. Gurbachan Singh, Chairman, ASRB, New Delhi for being Chief Guest during the Valedictory session and addressing the delegates which served as food for thought for re-orienting the KVK programmes.

Thanks are also due to Shri Sudhir Bhargava, Member Governing Body and Shri Kuldeep Dhaliwal, Member General Body of ICAR for participating in the conference and sharing their experiences. I also sincerely thank all Chairs, Co-Chairs, Panelists, Rapporteurs and participants for holding the scientific deliberations around the main theme of Conference. The KVKs, SAUs, ICAR institutes and other individual farm innovators and farm women who participated in the exhibition also deserve my appreciation.

I sincerely thank Dr. B.S. Dhillon, Vice Chancellor, Punjab Agricultural University, Ludhiana for delivering welcome address at inaugural session, presiding over valedictory session and giving concluding remarks and for ensuring all logistics and making nice arrangements for smooth conduct of the Conference. The whole team of PAU officers and staff also deserve my compliments for holding the Conference successfully.

I congratulate Dr. A.M. Narula, Zonal Project Director, Zonal Project Directorate Zone-I, ICAR, Ludhiana, his team of scientists, staff and Dr. V.P. Chahal, Principal Scientist (AE) for effective technical co-ordination, compiling and editing the proceedings of the Conference. The contribution of all Zonal Project Directors, DEEs and the scientists is also appreciated.

I am sure the proceedings of the Conference will be useful and serve as ready reference to programme coordinators, scientists, administrators and policy makers. It is hoped that all stakeholders would reorient their activities according to the action points for making sustainable development of Indian agriculture and prosperity among farming community.

(K D KOKATE)
With great honour and immense pleasure, I express and extend my heartiest gratitude to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar Ji, for according his consent to organize the conference at Punjab Agricultural University (PAU), Ludhiana; inaugurating the “Exhibition cum Innovation market place” as well as the conference; and also for providing continued support for successful organization of this conference. I express my gratitude to Dr. Charan Das Mahant Ji, Hon’ble Union Minister of State for Agriculture and Food Processing Industries for his kind presence and presiding over the inaugural session of the Conference.

I express my sincere gratitude to Hon’ble Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR, whose untiring efforts and ignited leadership have brought vibrancy to the KVK system, for his valuable guidance, conceptualization, planning and organizing of the 7th National Conference on KVK.

I would like to place on record my heartfelt thanks to Dr. K.D. Kokate, Deputy Director General (Agricultural Extension), Division of Agricultural Extension, ICAR, New Delhi for his timely help, encouragement, inspiration, motivation, keen interest, constructive criticism and valuable suggestions for successful organization of the Conference and providing all support and guidance for bringing out the proceedings.

My heartiest gratitude is extended to Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana for his kind consent, guidance and all types of support in organizing this mega event without which the grand success of the conference could not be achieved.

I sincerely thank Deputy Directors General of ICAR, Assistant Directors General of ICAR, Vice-Chancellors of Agricultural Universities, Directors of ICAR Institutes, Directors of Extension of Agricultural Universities, Heads of NGOs, Zonal Project Directors, Programme Coordinators and Subject Matter Specialists of KVKs for their participation, technical support, valuable guidance, active co-operation and co-ordination for conducting various sessions effectively and efficiently during the Conference.

I express special appreciation to all the Chairpersons, Co-Chairpersons and members of committees for their committed involvement in planning and organization of this
Conference. I extend my special thanks to funding agencies for financial help in the form of sponsorship and advertisement.

I extend my gratitude to officials from the Union Government and State Government, all the delegates and members of the different committees, team of officials from Division of Agricultural Extension, ICAR, Staff of Zonal Project Directorates and one and all those who have directly or indirectly provided their support and assistance to organize the Conference and making it as a grand success.

(A.M. NARULA)
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Executive Summary

7th National Conference on Krishi Vigyan Kendra

The challenges to Indian agriculture include resilience to climate change, shrinking natural resources, fragmentation of farm holdings, changes in farming systems and change in demand as well as food consumption pattern. The integration of technologies and best practices can meet these potentially conflicting challenges at farm level for balanced agricultural growth with sustainable food production, high profitability, equity and environmental care. Such approach seeks to reinforce the positive influences of agricultural production whilst reducing its negative impacts.

In this context, organization of 7th National Conference on KVK on 20-22 November, 2012 at Punjab Agricultural University with the theme “Integrating Technologies and Best Practices” was a timely initiative. The Conference was structured into eight technical sessions viz. i) Convergence and linkages between KVK-ATMA programmes- best successful cases of field extension; ii) KVK’s best practices and innovative approaches for out-scaling technologies; iii) Best practices and technologies for higher production, value addition and improved livelihood; iv) Facilitating KVKs in management, administrative & financial matters; v) Farm innovations and best practices developed by farmers; vi) ICT mediated best practices in knowledge empowerment of farmers; vii) Integration of best practices and technologies under NICRA-project; and viii) Technological backstopping and harnessing synergy of working in partnership mode. Besides, the program also included two special lectures namely “Krishi Vigyan Kendras: India’s Institutional Innovation Inspiring the World in the 21st Century” by Dr. Peter E. Kenmore (FAO representative) and “Programming Mind for Success and Unleashing Human Potential for Higher Productivity” by Mr. Sunil Parekh (Freelance HRD Consultant). An exhibition and innovation market place was also organized in which 10 ICAR institutes, 10 SAUs, 30 KVKs and 10 SHGs/farm women from all over the country as well as Directorate of Research on Women in Agriculture, Bhubaneswar put up stalls and exhibited technologies/best practices/products. About 1250 delegates from 630 KVKs across the country as well as other stakeholders took part and shared their ideas and experiences.

Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar Ji inaugurated the Conference as well as the exhibition on November 20, 2012. The inaugural session was presided over by Dr. Charan Das Mahant, Union Minister of State for Agriculture and Food Processing Industries. The session was graced by Dr. S. Ayyappan, Secretary, DARE and DG, ICAR; Deputy Director Generals of ICAR, Assistant Director Generals of ICAR; Vice-Chancellors and Directors of Extension Education of SAUs; Director of ICAR institutes; Zonal Project Directors; Scientists; Heads of the
NGOs having KVKs and Programme Coordinators of KVKs. Dr. B.S. Dhillon, Vice Chancellor, Punjab Agricultural University, Ludhiana extended a warm and hearty welcome to all the dignitaries and delegates and appreciated the KVKs for playing a pivotal role in bridging the gap of knowledge between scientists and farmers through assessment, refinement and demonstration of technologies/products of agriculture and allied sectors. Dr. K.D. Kokate, Deputy Director General (Agricultural Extension), ICAR, New Delhi gave a brief account of the Conference and underscored the importance of the integration of technologies for a given farming situation with best practices. Emphasizing the role of KVKs at district level, he reiterated that the KVKs are functioning as resource and knowledge centres and thereby were “Think Hub” and “Link Hub” of integrating technologies and best practices through their intermediary role with technology generation institutions and stake holders including resource poor farmers in far flung areas.

Dr. S. Ayyappan, Secretary (DARE) and Director General (ICAR) in his opening remarks, opined that KVK, as an institution, have become a mission and a mechanism for linkage with farmers all the time from Kargil to Car Nicobar and from Dwarka to Dirang. KVKs have actively responded to the odd situations in helping the farmers get rid of natural vagaries like erratic monsoon, abrupt climatic changes and recent cyclone in the country. He emphasized on real and functional partnerships of KVKs with other organizations especially Nehru Yuva Kendras for capacity building of rural youth.

Dr. Charan Das Mahant, Hon’ble Union Minister of State for Agriculture and Food Processing Industries in his address opined that efforts of scientists of National Agricultural Research Systems, extension workers and farmers had made the country self-sufficient in food production. He stressed upon the need for further increase in agricultural production with focus on quality and minimizing post harvest losses.

Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar released two publications/CDs and conferred “Champion Female Farmer Awards” as well as “Best KVK Awards” 2011. In his inaugural address, he appreciated the farming community and agricultural scientists of the country for record highest food grain production of 257 million tons last year. He hoped that inspite of some problems like droughts in some part of Maharashtra, Gujarat, Rajasthan, Karnataka and Punjab, the country would be harvesting more than 250 million tons of food grains which would resolve the issue of food security of the country for the next two years. He also appreciated the significant role of Country’s agriculture in International trade from export of agricultural commodities. He appreciated the farming community of the country for ensuring food security to 1.2 billion population and added that dairy, fishery and horticulture sectors have also excelled during last three years due to congenial policies of Central Government, appropriate support by the State Governments and the instrumental role played by the agricultural research and education institutions. He stressed upon to optimize and harness the returns from livestock, poultry and fishery sectors for bridging
the yield gaps of small holder farmers engaged in livestock and fisheries; speed up the efforts to develop climate resilient crop varieties, cropping pattern and management practices to mitigate climate change effects; and pay special attention on women’s role in agriculture.

Dr. A. M. Narula, Zonal Project Director, Zone-I, Ludhiana proposed the vote of thanks to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar, other dignitaries on/off the dais and the participants of the Conference.

The first technical session on “Convergence and Linkages between KVK-ATMA Programmes-Best Successful Cases of Field Extension” included 11 joint presentations by Heads of KVKs and ATMAs while 14 presentations by Programme Coordinators (PCs) of KVKs were made in the second technical session on “KVK Best Practices and Innovative Approaches for Out-scaling Technologies”. “Best Practices and Technologies for Higher production, Value Addition and Improved Livelihood” was the third technical session in which four presentations were made by ADGs of ICAR. A total of twelve speakers delivered talks in the fourth technical session on “Facilitating KVKs in Management, Administrative & Financial Matters”. Fifteen innovators shared their experiences of best practices in the fifth technical session on “Farm Innovations and Best Practices Developed by Farmers”. Under technical session six, four presentations were made by ICT experts of different organizations on “ICT Mediated Best Practices in Knowledge Empowerment of Farmers”. “Integration of Best Practices and Technologies under NICRA-Project” was the seventh technical session in which Dr. Srinivas Rao, Principal Scientist, CRIDA, Hyderabad delivered his talk on “Consolidating the gains of NICRA project-Lessons for up-scaling”. and PCs of 10 KVKs under NICRA project presented experiences of KVKs in application of climate resilient technologies. The last technical session on “Technological Backstopping and Harnessing Synergy of Working in Partnership Mode” comprised of twelve presentations by representatives of agricultural organizations of public and private sectors.

Dr. Gurbachan Singh, Chairman, Agricultural Scientist Recruitment Board, New Delhi was the Chief Guest of the valedictory session. Dr. A. M. Narula, Zonal Project Director, Zone-I, Ludhiana welcomed the Chief Guest, other dignitaries and all participants. The DDG (Agricultural Extension) ICAR, Dr. K.D. Kokate gave his remarks and presented the major recommendations emerged out of the deliberations during the Conference.

The Chief Guest opined that anticipatory thinking was very much important in view of changing scenario and shifting priorities in agriculture sector. He called upon the KVK Scientists to lead the field extension system as “Think Tank” to combat with the changing situations. He further opined that integrated farming on small holdings and its mechanization are the only ways to second Green Revolution. He urged the KVKs to take new varieties of different crops to the farmers’ fields breaking the boundaries of SAUs/states. In his concluding remarks, Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana
appreciated the presentations by farmers and KVKs; and the exhibition organized during the Conference. He suggested that SAUs and KVKs would have to work on technologies by breaking the state boundaries. The session ended with vote of thanks to all dignitaries, organizers and participants by Dr. V. Venkatasubramanian, ADG (AE), ICAR and Dr. M.S. Gill, DEE, PAU Ludhiana on behalf of ICAR and PAU, respectively.

Chronological events of the Conference as well as session wise proceedings have been recorded and presented in this document. The salient action points and recommendations emerged from the deliberations during the Conference are as under:

• The success achieved in the institutional and functional linkages between ATMA and KVK need further catalyzing it for nation-wide up-scaling.
• The successful process and methodological aspects of KVK-ATMA convergence should be documented elaborately and made available to all the stakeholders for replication as per the needs of the district.
• ATMA-KVK convergence is essential for developing each village into Knowledge Centre. As the number of farmers and area to be covered in each district is huge, farmer-to-farmer extension needs to be institutionalized through ATMA-KVK convergence.
• As there cannot be any substitution to public extension, public and private extension systems must work synergistically to achieve the welfare of all categories of farmers.
• Feed forward provided by the KVK to ATMA and the utility of feedback received from ATMA in preparation of action plan of KVK has been a major gain of the convergence and needs to be harnessed appropriately.
• Fund flow from ATMA to KVKs is highly skewed and varies from district to district and hence there is a need for uniformity in fund flow to all the KVKs and must be provided to KVKs directly.
• Planning must be bottom-up and involvement of farmers in this process is very crucial, particularly in the promotion of market-led extension.
• Pre-seasonal interfaces between ICAR and DAC must include Vice-Chancellors of SAUs so that issues related to convergence can be discussed.
• Technical backstopping of KVK and ATMA by the ICAR institutes and SAUs needs special attention.
• There is a need for revisiting the joint circular on convergence to make the convergence process more operationally feasible. Some of the proposed changes include quarterly meetings, earmarking of funds to KVKs, visit of ATMA staff to the cluster villages of KVKs and ATMA sponsorship for Technology Weeks being organized by KVKs.
The Directors of Extension Education (DEEs) of all the SAUs must consult the SREPs and DAAPs of all the districts and guide the KVKs in developing their action plans.

KVKs should be guided by DEEs and ZPDs and be given operational freedom and flexibility for managing and conducting Research-Extension-Farmer (R-E-F) linkage activities under ATMA without diluting the mandated activities of KVKs.

The successful agri-entrepreneurs could be used for mobilizing other farmers through PPP mode jointly by KVK-ATMA as per provisions in the ATMA scheme.

Orientation of Farmer Friends (FF) & Block Level Farmers Advisory Committee Members (BFACs) may be done by KVKs on regular basis.

Successful custom hiring and entrepreneurship development models and programs of NICRA project involving tribal and other resource poor farmers with focus on human capital, social psychological and poverty alleviation approaches may be documented and up-scaled in other villages.

The climate resilient technologies like conservation agriculture, zero tillage, varietal replacement, direct seeded rice, woman specific technologies etc., demonstrated by KVKs under NICRA project need to be documented and shared with ATMA for large scale adoption.

There is a score for large scale adoption of agro-technologies like DSR, suitable paddy cultivars cum fish culture, farm mechanization, ZT wheat, inter-cropping in sugarcane for increasing production of rice, wheat and sugarcane crops with higher returns per unit area in flood prone areas.

Emphasis should be laid on intensive awareness for water conservation through use of mini sprinkler/ drip irrigation, use of mulching including plastic mulch, integrated water management approach through Public-Private-Community partnership.

In rainfed areas, use of rain gun or sprinkler at critical stages such as flowering, peg formation and pod development and intercropping of groundnut + castor or cotton be followed for higher crop sustenance.

For reduction in investments towards the purchase of external inputs, community based institutions/ user groups should be created for effective utilization of farm and home resources. Special emphasis be laid on livelihood security through group based approach, soil and water conservation through watershed approach, animal health promotion and welfare, commercial nursery promotion and scientific grain storage.

KVKs should lay emphasis on Integrated Farming System models for small and marginal land holdings.
• Conservation agriculture using zero tillage and varietal replacement, women empowerment through integrated activities including women SHGs and capacity building of youth volunteers/youth groups should be followed across the locations.

• Replacement of wheat straw with paddy straw (20 to 50%) for mushroom cultivation and diversification of rice-wheat cropping system with summer moong should be up-scaled on large scale in northern states.

• The KVK has emerged as institutional innovation for carrying out adaptive research like technology assessment, refinement and its demonstration in farmer’s field. The KVK system should partner with global organization like FAO for mutual benefit and replicating KVK like institutions in other countries keeping in view their needs and requirements.

• The ICAR institutes and agricultural universities should ensure technology flow to KVKs to reduce the time lag in application of frontier technologies related crop science; horticulture; farm machinery implements and agro-processing; livestock; fisheries; and aquaculture and other suitable enterprise.

• Livestock- based advisory and diagnostics may also be given priority in KVK programs.

• The fisheries sector requires collective wisdom, implementable policies, clear vision for future, large investment in infrastructure, access to local & distant markets and safeguards against natural disasters for further holistic progress of fisheries.

• Timely flow of fund from host organizations to KVKs may be given priority.

• The Programme Coordinators of KVKs should be given/delegated administrative and financial powers to equivalent to Heads of departments/divisions in AUs and ICAR Institutes.

• Timely submission of Actual Expenditure Statement as well as Audited Utilization Certificate by the host organizations for further release of funds and effective implementation of technical programme.

• Lacunae are being observed in the proposals of condemnation of KVK vehicles, and these should be screened thoroughly by the host organizations to avoid the delay in the process and therefore it is suggested that condemnation of vehicles should be proposed based on the approved rules of ICAR (GFRs).

• Diversion of funds must be stopped i.e. the fund allocated for capital assets should not be used in revenue head and vice-versa. Re-appropriation of budget must be approved from the ICAR. The expenditure should not exceed the approved budget.

• Vacant posts in KVKs should be filled up as soon as possible as per latest qualifications and in consultation with Zonal Project Directors.
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- The revolving fund provided to KVKs must be returned to ICAR within 5 years.
- Provision of reservation to physically challenged persons must be made irrespective of host organization as per rules.
- Custom hiring, IFS, rain water harvesting structures may be extended to more number of KVKs.
- Motivation in terms of remote area allowances/difficult area allowance may be paid to the KVK staff as per the existing rules to avoid the frequent transfers.
- Refreshment charges for trainings need to be enhanced as per provisions equal to other schemes of Government of India.
- Convergence with line departments may be followed without affecting the core functions of KVKs.
- Provision of TA/DA may be made for Innovative farmers and farm Innovators meets should be organized at least once in a year.
- The pay scales of the SMSs should be at par with Assistant Professors of SAUs and Scientists of ICAR Institute and gratuity may be extended to KVK staff irrespective of host organizations.
- Guidelines with respect to administration and financial matters of KVKs may be circulated to all host organizations as well as KVKs.
- Availability of seeds of newly released varieties and hybrids is a constraint for KVKs, the DEEs and ZPDs should ensure the availability of newly released varieties and hybrids to KVKs.
- National level repository of technologies and best practices may be prepared and circulated among KVKs for better utilization and up-scaling.
- Some of the KVKs may be provided additional funds and developed as Centres of Excellence or specialized KVKs during XII plan.
- There is a need for regular capacity building of administrative and account staff of KVKs and ZPDs on office procedures and financial management.
- Vice Chancellors of AU’s should be in constant touch with the DEEs for effective functioning of KVKs. A quarterly review meeting of all KVKs should be held under the chairmanship of VCs to review the functioning of KVKs.
- DEEs should play active role in KVK monitoring and technological inventory prepared by SAUs need to be updated regularly.
- Criteria for Zonal KVK Awards may be re-looked as it is not only based on the documentation, hence, ZPDs may be involved in short listing the KVKs.
- Proper documentation of work done by the KVKs and its impact assessment may be given utmost priority.
The KVKs should identify more number of farm innovations and best practices developed by farmers for its assessment and validation. If needed, help of SAUs/ICAR Institutes may be sought. The validated practices should be up-scaled by KVKs, ATMA and line departments for the benefit of small and marginal as well as resource poor farmers.

Prototype of farm implements should be developed in public-private-partnership mode for providing such facilities to other farmers.

Services of Innovator farmers should be utilized by the KVKs for motivating other farmers.

The experiences of “Digital Green” in documentation of best practices through community participatory video clips provide scope for interactive and horizontal learning. Such ICT mediated approach can be further tested and refined by KVKs in public-private partnership mode to establish its relevance in field extension.

Research on ICT application in terms of cost effective information acquisition, improving efficiency of KVKs, impact of ICT interventions and linkages with organizations need to be strengthened.

Strategic collaboration of partners is to be encouraged for ICT based knowledge modeling in view of local knowledge base, local needs and research-based outputs as well as socio-economic and cultural factors, besides content and capacity building of the partners.

Innovations in Mobile-based information system have tremendous scope of more coverage of farmers, last mile connectivity and interactivity. The experiences of mKRISHI and IKSL are encouraging and can be further improved based on feedback and public private partnership.

Capacity building of KVK staff through ICT mediated tools may be encouraged for data acquisition, processing, analysis, and sharing from remote sensing for effective functioning of KVKs.

NICRA project need to be expanded to other districts in all Zones, preferably 25 additional districts in each Zone.

Technological interventions being undertaken under NICRA need to be converged with other Government schemes such as RKVY, MGNREGA, etc.

Cost effective technologies such as zero tillage, water harvesting and conservation methods, custom hiring of implements and many more need to be up-scaled under NICRA.

Increased degree of cross learning is required among the KVKs operating NICRA project.

The scientific issues of technological interventions, success stories, constraints and
bottlenecks faced during the implementation period need to be documented for ready reference by the stakeholders.

- Response of technologies under varied conditions of biotic and abiotic stress need to be assessed before taking up under demonstrations.
- KVKs have to be linked with ZTM and BPD units for effective backstopping and commercialization of assessed and refined technologies.
- Effective public-private partnership has to be encouraged for raising agricultural productivity and enhancing farmers’ income. Such partnership should serve mutual interest of farmers, KVKs and the Corporates to ensure availability of required quality inputs, diagnostic and advisory on soil and plant health and assistance in profitable marketing of produce.
- The agro-input companies should form a Consortium and develop long term strategic partnership with KVK system for working on issues of national importance like conservation of natural resources, renewable energy, malnutrition, risk mitigation, input use efficiency in agriculture, gender disparity etc.
- The KVK system should provide technological backstopping to the agricultural programmes and such other initiatives of private sector designed as part of their Corporate Social Responsibility for the small and marginal farmers and landless agricultural labourers.
- Successful models of public-private convergence may be collated and the processes facilitating such models need to be brought out and used for up-scaling.
- KVKs may focus their programmes to address the requirements of the marginal/ small farmers in the context of changing climate on ecological principles.
- Emphasis should be given on integrated farming and mechanization for small holdings.
- There is a need to cross the SAU boundaries by KVKs for getting technologies generated by NARS and testing their suitability in the agro-ecosystems of their districts.
- The various programmes of different agencies meant for agricultural development should be dovetailed with each other.
- Farmer’s innovations should be regularly validated by KVKs for further up-scaling in different agro-climatic zones of the country.
The Indian Council of agricultural research (ICAR) is an apex body for co-ordinating, guiding and managing research, education and extension in agriculture including horticulture, fisheries and animal sciences in the entire country, head quarter at New Delhi. ICAR is one of the largest National Agricultural Research Systems in the world. The Council has played a pioneer role in ushering different revolutions and subsequent developments in agriculture in India through its strong research and technology development.

In order to assess, refine and demonstrate the agricultural technologies in micro-farming situations of the farmers under various production systems operated under different agro-ecologies in the country, the ICAR has created a network of more than 630 Krishi Vigyan Kendras (KVKs). The KVKs are being guided by Division of Agricultural Extension, one of the eight Subject Matter Divisions of ICAR through its eight Zonal Project Directorates. Since 2005, ICAR has been organizing National Conference on KVK for providing an opportunity to share their knowledge and experiences across the country and also orient KVKs to changing agricultural scenario in the country. In this series, the 7th National Conference on KVK-2012 was organized with the theme “Integrating Technologies and Best Practices” at Punjab Agricultural University, Ludhiana from 20 to 22 November, 2012.

About 1200 delegates from across the country participated in the Conference. Deliberations were held in eight technical sessions on various themes and participated by the Programme Coordinators, Extension and Development Professionals, Researchers, Administrators, Policy makers and other stakeholders from different organizations from all over the country. Further, during the Conference, Technology Exhibition and Innovation Market Place was organized wherein KVKs, ICAR Institutes and SAUs from all over the country put up their stalls. Besides, SHGs/farm women and Directorate of Research of Women in Agriculture, Bhubaneshwar exhibited their products in the market place.

The deliberations and proceedings of Conference have been documented in this publication based on chronological events of the Conference for use and ready reference of the stakeholders.
Inaugural Session

Inauguration of Exhibition cum Innovation Market Place: Shri Sharad Pawar
Hon’ble Union Minister of Agriculture & Food Processing Industries, Government of India, New Delhi

ICAR Song/Invocation/Lighting of lamp

Welcome Address: Dr. B.S. Dhillon
Vice Chancellor, PAU, Ludhiana

About the Conference: Dr. K.D. Kokate
DDG (AE), ICAR, New Delhi

Opening Remarks: Dr. S. Ayyappan
Secretary, DARE and DG, ICAR, New Delhi

Special Remarks: Dr. Charan Das Mahant
Hon’ble Union Minister of State for Agriculture and Food Processing Industries, Government of India, New Delhi

Release of Publications: All Dignitaries on the Dais

Inaugural Address and Conferment of Awards: Shri Sharad Pawar
Hon’ble Union Minister of Agriculture & Food Processing Industries, Government of India, New Delhi

Vote of Thanks: Dr A.M. Narula
Zonal Project Director, Zone-I, Ludhiana

National Anthem
A View of Inaugural Session of the Conference
INAUGURAL session of the 7th National Conference on Krishi Vigyan Kendra was held on 20th November, 2012 at Punjab Agricultural University Campus, Ludhiana and delegates representing all the districts across the country participated in the session. The Conference was inaugurated by Shri Sharad Pawar, Hon’ble Union Minister of Agriculture and Food Processing Industries on 20th November, 2012 at Pal Auditorium, Punjab Agricultural University (PAU), Ludhiana. Dr. Charan Das Mahant, Union Minister of State for Agriculture and Food Processing Industries was Guest of Honour in the Inaugural Function. Before the Inaugural Function, Shri Sharad Pawar inaugurated the “Exhibition and Innovation Market Place”.

Welcome address

Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana extended a heartiest warm welcome to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar. He gratefully acknowledged the dedication and commitment of the Hon’ble Union Minister for ICAR, KVKs, agriculture and farming community of the nation under whose dynamic leadership, a network of 630 KVKs is playing a pivotal role in bridging the gap of knowledge between scientists and farmers. He expressed his gratitude to the ICAR under the leadership and guidance of Shri Pawar Ji for giving the opportunity of organizing the mega event at PAU, Ludhiana.

Dr. Dhillon warmly welcomed Dr. Charan Das Mahant, the Hon’ble Union Minister of State for Agriculture and Food Processing Industries and expressed his gratitude for guiding the KVK professionals in serving the farming community and gracing the inaugural function of the Conference.

The Vice Chancellor heartily welcomed the renowned agriculture visionary Dr. S. Ayyappan, Secretary (DARE) and Director General (ICAR) under whose guidance and directions, the Conference has been organized. He extended warm welcome to Dr. K.D. Kokate, Deputy Director General (Agricultural Extension), Dr. Sudhir Bhargava, Member, Governing Body and Shri Kuldeep Dhaliwal, Member General Body of ICAR. He also extended warm welcome to DDGs, National Director, NAIP, ADGs and Directors of ICAR institutes, Vice Chancellors and Directors of Extension Education of agricultural universities, Chairpersons of NGOs, Programme Coordinators of KVKs and all other participants.
About the Conference

At the outset, Dr. K. D. Kokate, DDG (AE), ICAR also extended a hearty welcome to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar; Hon’ble Union Minister of State for Agriculture and Food Processing Industries, Dr. Charan Das Mahant; Dr. S. Ayyappan, Secretary (DARE) and Director General (ICAR); Vice Chancellor, PAU, Ludhiana, Dr. B. S. Dhillon; all delegates and participants.

Emphasizing the contribution of National Agricultural Research System (NARS) in transformation of Indian agriculture, Dr. Kokate expressed satisfaction over harmonized functioning of ICAR institutions, SAUs, NGOs and KVKs in developing innovative extension models and methodologies to reach the unreached. He opined that sharing of experiences and cross learning was one of the strategies for strengthening KVKs. For that purpose, National Conference on KVK has been organized on specific theme every year since 2005. He informed that earlier Conferences have so far covered various themes including Technological empowerment of KVKs through readily transferable technologies; policy framework for technology development and delivery system; Socio-economic and technological empowerment of farmers; KVK as knowledge and resource centre for agricultural technology; Farm innovations & agri-preneurs and Enabling farmers for secondary agriculture.

He further expressed that identification of best practices, from the available basket of technologies, suited to various farming conditions is of paramount importance. Consequently, recognizing the need for effective integration of technologies and best practices for ensuring sustainability, the theme identified for the ensuing Conference was “Integrating Technologies and Best Practices”.

He briefed the dignitaries and delegates about the eight technical sessions on various themes namely i) Convergence and Linkages between KVK-ATMA Programmes- Best Successful Cases of Field Extension; ii) KVK’s Best Practices and Innovative Approaches for Out-scaling Technologies; iii) Best Practices and Technologies for Higher Production, Value Addition and Improved Livelihood; iv) Facilitating KVKs in Management, Administrative and Financial Matters; v) Farm Innovations and Best Practices Developed by Farmers; vi) ICT Mediated Best Practices in Knowledge Empowerment of Farmers; vii) Integration of Best Practices and Technologies under NICRA Project; and viii) Technological Backstopping and Harnessing Synergy of Working in Partnership Mode”. Dr. Kokate also pointed out that besides these technical sessions, the program also included
two special lectures by FAO representative- “Krishi Vigyan Kendras: India’s Institutional Innovation Inspiring the World in the 21st Century” and “Programming Mind for Success and Unleashing Human Potential for Higher Productivity” for motivating and tapping one’s infinite inner potential among KVK personnel. He also advised the delegates to take advantage of best technologies and practices put up in Exhibition cum Innovation Market Place for enriching and sharing experiences.

He underscored the importance of the integration of technology for a given farming situation which would be crucial for faster out scaling of the technologies by KVKs to main extension system leading to effective technology adoption. Dr. Kokate also emphasized that judicious integration of technology would be vital for substantially enhancing profitability, sustainability and resource use efficiency in the changing agricultural scenario. Emphasizing the role of KVKs at district level, he said that these are functioning as resource and knowledge centre and thereby are “Think Hub” and “Link Hub” of Integrating Technology and Best Practices through their intermediary role with technology generation institution and stakeholders including resource poor farmers in far flung areas.

Dr. Kokate said that Indian agriculture has been consistently supported and nurtured by the great visionary and leader as well as Champion of farmers, Hon’ble Union Minister of Agriculture and Food Processing Industries Shri Pawar Sahib who has been consistently serving for the cause of farmers and overall agricultural development in the country. He informed that it was decided to establish one KVK in each rural district and subsequently two KVKs in each larger district only under his wise and visionary stewardship. Since 1974, ICAR could establish 630 KVKs in the country out of which 341 KVKs have been established during last 8 years under his leadership. He saluted the political will and scientific institution building approach of Shri Pawar Sahib for transforming Indian Agriculture. At last, he opined that the three days deliberations in this Conference would set the agenda for futuristic agriculture in the country.

Opening Remarks

While delivering his opening remarks, Dr. S. Ayyappan, Secretary (DARE) and Director

Inaugural Session
General (ICAR) also extended a hearty welcome to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar ji and Hon’ble Union Minister of State for Agriculture and Food Processing Industries, Dr. Charan Das Mahant ji.

He highlighted that KVK movement of ICAR has transformed over the years. From an institution, it has become a mission and a strong mechanism for linking farmers in the country from Kargil to Car Nicobar and from Dwarka to Dirang. Whether it was weather advisories, erratic monsoon, climate resilient technologies or disaster management during the recent cyclone, the KVKs have actively responded to the odd situations in helping farmers to get rid of such vagaries. He informed that KVK model is being appreciated overseas also. He termed his visits to KVKs during the past years as a great learning experience. He informed the house that efforts are being made to incorporate agriculture in school curriculum to attract and retain youth in agriculture. He emphasized on real and functional partnerships of KVKs with other organizations like Nehru Yuva Kendras. Dr. Ayyappan pointed out that the issues like Secondary Agriculture with dimensions like post harvest management and value addition, Farm Innovators’ Funds and Technology Cafeteria and information units would be addressed in XII Plan in order to enable the KVKs to become a one spot solution provider to agricultural problems of farmers. Whereas, he also pointed out that the next step would be to link various issues like food & nutrition, rural health hygiene, environmental safety and employment all together at local level. At that stage, quality assurance and food safety would become important and that’s why we have to talk about value for money through KVKs. He expressed that 7th National Conference would be a milestone, a monumental meeting to take all these initiatives as mission in the XII Plan.

At the end, he again expressed his deep sense of gratitude to Hon’ble Union Minister Shri Sharad Pawar, who travelled whole night by road to give blessings to the KVK family.

**Special Remarks**

Dr. Charan Das Mahant, in his address, applauded the leadership of Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar ji for making the Indian agricultural sector, the most vibrant sector of Indian economy. He expressed his happiness over the 7th National Conference on KVK being organized at an esteemed university which contributed a lot in bringing Green Revolution in the country by releasing more than 700 varieties of different crops. By quoting the saying of Pt. Jawahar Lal Nehru on agriculture “Any thing can wait but not the Agriculture”, he expressed his
gratitude to Shri Sharad Pawar ji who understands the intension behind the saying. He opined that efforts of scientists of National Agricultural Research System, extension workers and farmers had made the country self sufficient in food production indicating that at present our country is one of the largest producers of paddy, wheat, edible oil, fruits, tea, coffee, milk and cotton. He cautioned that agricultural situations are changing now, while our population is increasing and landholding size is decreasing day by day. The Hon’ble MoS pointed out that per capita income has increased and people have become health conscious, therefore, keeping these changes in mind, there is a need to increase agricultural production with focus on quality. He also stressed upon reducing post harvest damages and losses through better post harvest management of agricultural produce. Undoubtedly, he mentioned that KVK is an innovative programme of ICAR in which team of multi-disciplinary agricultural scientists is engaged in bringing agricultural science and technology to farmers’ fields.

**Release of Publications**

During the session, the Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar released two publications namely, Souvenir of 7th National Conference on KVK-2012 published by PAU, Ludhiana and Farm Innovators: The Backyard Scientists (KVKs of Zone-I) published by Zonal Project Directorate, Zone-I, Ludhiana. Hon’ble Union Minister of State for Agriculture and Food Processing Industries, Dr. Charan Das Mahant released a book titled *Sanrakshit Khetee: Himachal Pradesh Mein Krishi Vigyan Kendron Ke Prayas* (Hindi) published by Zonal Project Directorate, Zone-I, Ludhiana and a DVD of different activities of KVKs of Zone – I.
Conferment of KVK Awards

Shri Sharad Pawar, Hon’ble Union Minister of Agriculture and Food Processing Industries bestowed Champion Women Farmer Award 2012 to Smt. Krishna Yadav, an agri-preneur from Delhi and Smt. Karamjeet Kaur, a Kinnow grower from Fazilka of Punjab. He also conferred National and Zonal KVK Awards 2011 to the KVKs. KVK, Ahmednagar got National award, while KVK Kaithal (Zone-I); KVK South 24 Parganas (Zone-II); KVK West Tripura (Zone-III); KVK Saharanpur (Zone-IV); KVK Amrawati (Durgapur) (Zone-V); KVK Anta Baran (Zone-VI); KVK Jhabua (Zone-VII) and KVK Calicut (Zone-VIII) were conferred with Zonal Award.
Conferment of Best KVK Zonal Awards 2011 to KVKs
At the outset, Shri Sharad Pawar, Hon’ble Union Minister of Agriculture and Food Processing Industries, greeted with enthusiasm all the participants and expressed happiness in addressing the delegates in all the seven Conferences consecutively since 2005. He applauded the Punjab Agricultural University for willingly shouldering the responsibility of hosting the 7th Conference in its Golden Jubilee year. He appreciated the world class infrastructure, congenial learning environment and high tradition of research, education and technology transfer in the University and its role in increased agricultural production in Punjab. He informed the galaxy of audience about establishment of International Borlaug Institute on Wheat and Maize in Ludhiana. He saluted the farming community and the agricultural scientists of the country for record highest food grain production of 257 million tons last year since independence. He further added that inspite of some problems like drought in some part of Maharashtra, Gujarat, Rajasthan, Karnataka and even Punjab, the country would be harvesting more than 250 million tons of food grain which would resolve the issue of food security of the country for the next two years. Not only that, the Country’s agriculture played a significant role in International Trade by earning Rs. 186000 crore from export of agricultural commodities. Last year, India exported 10 million tons of rice, 3.5 million tons of wheat, 8.1 million bales of cotton and 2.5 million tons of sugar. In one of the Conferences of FAO, he was congratulated by representatives of many countries for exporting huge quantity of rice and wheat which helped in keeping the price of rice under control all over the world. The stock of rice and wheat in the central pool with the Food Corporation of India is three times more than the established buffer stock norms. He expressed satisfaction over prompt, timely and adequate response by the concerned departments to erratic and delayed monsoon this year. He opined that farming community of the country deserve congratulations for ensuring food security to 1.2 billion population. He pointed out that the success story of agriculture was not confined to food grain production only, whilst the dairy, fishery and horticulture sectors also excelled during last seven years. All those achievements were possible due to enabling policies of Central Government, appropriate support by the State Governments and the instrumental role played by the agricultural research and development organizations.

While appreciating the performance of agriculture sector, he highlighted the challenges too in the coming years including the most pressing need for a breakthrough in the
productivity of many crops particularly that of pulses and oilseeds. Every year the country spends largely on import of pulses and oilseeds, respectively. He called upon the scientific community of the country and particularly the KVK fraternity to work hard in those two sectors to relieve the country’s dependence on import. He also indicated that though India is largest producer of milk, however, it is yet to fulfill the country’s demand for milk. He informed that the government has launched an ambitious National Dairy Plan with an aim to match the demand of 150 million tonnes milk by the end of XII plan. In order to optimize and harness the returns from livestock, poultry and fishery sectors, he emphasized the need to focus on bridging the yield gaps by increasing productivity of small holders engaged in livestock and fisheries. In the coming years, he stated that farmers have to produce more fruits, vegetables, and protein rich products like, egg, fish, and meat because, with increasing income of the people and changing dietary habits, the demand of these items would increase. He suggested a multi-pronged strategy which seeks to boost productivity and production through product-specific interventions. While taking climate change as a major challenge to Indian agriculture, he felt the necessity to speed up the efforts to develop climate resilient crop varieties, cropping pattern and management practices. He appreciated the efforts made by 100 KVKs in transferring climate resilient technologies to farmers’ fields under NICRA project of ICAR besides research initiatives on such issues by newly established National Institute of Abiotic Stress Management. He informed that Government has also approved establishment of two institutes namely, Indian Institute of Agricultural Biotechnology at Ranchi and National Biotic Stress Management Institute at Raipur to deal with such emerging issues. The Hon’ble Agriculture Minister also asked to give special attention to role of women in agriculture and suggested that the entire agricultural research and development chain must be gender sensitive. He also suggested the KVKs to develop technology specific extension models keeping in view the agro-eco systems and socio-economic conditions of the farmers and based on demand driven approach instead of supply driven approach. He added that in future, the KVKs would have to focus on quality extension education interventions like ISO Certification, besides, feedback mechanism is to be strengthened for better and demand driven research. He appreciated the working of KVKs in partnership mode. At the same time, he suggested that the focus of KVKs should be to minimize the input cost and maximize the farm output. At last, he congratulated the award winning KVKs and wished the Conference a grand success.

Vote of Thanks

Dr. A. M. Narula, Zonal Project Director, Zone-I, Ludhiana proposed the vote of thanks. On behalf of the Indian Council of Agricultural Research and Punjab Agricultural University, he expressed deep gratitude and thanks to Hon’ble Union Minister of Agriculture and Food Processing Industries, Shri Sharad Pawar ji for his participation in
the Conference as Chief Guest, inaugurating the exhibition and also for according his consent for organization of this Conference at PAU, Ludhiana.

Due thanks and indebtedness were also expressed to Hon’ble Union Minister of State for Agriculture and Food Processing Industries, Dr. Charan Das Mahant ji for gracing the occasion by his benign presence. Thanks were conveyed to Dr. S. Ayyappan, Secretary DARE and Director General ICAR, New Delhi for his unstinted support and guidance to the KVK system and for organizing the Conference in particular.

Dr. Narula expressed sincere thanks to Dr. Sudhir Bhargava, Member, Governing Body and Shri Kuldeep Dhaliwal, Member General Body of ICAR for their participation in the Conference. He also extended thanks to the Vice Chancellor, Director of Extension and staff of PAU for their involvement and extending all logistical facilities and support for organizing the Conference. Expressing his sincere gratitude, he thanked all the Deputy Directors General of ICAR, New Delhi especially Dr. K.D. Kokate, DDG (Agricultural Extension) and his team particularly Dr. V.P. Chahal, Principal Scientist (AE); Vice Chancellors; National Director, NAIP; Directors of ICAR Institutes; Assistant Directors General, Directors of Extension Education; Zonal Project Directors; Chairpersons of NGOs; representatives of the Ministries, State Government and Private Organizations and all the delegates. At the end he thanked one and all involved in the successful organization of this mega event.
Technology Exhibition
&
Innovation Market Place

Inauguration : Shri Sharad Pawar
Hon’ble Union Minister of Agriculture & Food Processing Industries, Government of India, New Delhi

Visit of Exhibition and Innovation Market Place:
- Krishi Vigyan Kendras
- Agricultural Universities
- ICAR Institutes
- SHGs and Agri-entrepreneurs
A View of Exhibition and Innovation Market Place
About the Exhibition

An Exhibition and Innovation Market Place was organized during the Conference. It was based on the theme of the Conference “Integrating Technologies and Best Practices”. The Exhibition and Innovation Market Place was inaugurated by Shri Sharad Pawar, Hon’ble Union Minister of Agriculture and Food Processing Industries on 20th November, 2012. The Hon’ble Union Minister of Agriculture and Food Processing Industries visited the stalls along with Dr. Charan Das Mahant, Union Minister of State for Agriculture and Food Processing Industries and other dignitaries and interacted with the scientists of KVKs, SAUs and ICAR institutes. A total of 50 stalls were put up by KVKs, SAUs and ICAR institutes. Besides, five self help groups (SHGs), two agri-entrepreneurs and All India Coordinated Research Project on Home Science displayed their products in the Innovation Market Place.

Krishi Vigyan Kendras

A total of 30 KVKs from across the country participated in the exhibition and displayed various location specific technologies integrated with best practices. The details of KVKs, which participated in the exhibition, are as follows:

1. Krishi Vigyan Kendra, Kaithal (Haryana), Zone – I
2. Krishi Vigyan Kendra, Bhiwani (Haryana), Zone – I
3. Krishi Vigyan Kendra, Faridkot (Punjab), Zone – I
4. Krishi Vigyan Kendra, Bathinda (Punjab), Zone – I
5. Krishi Vigyan Kendra, Shaheed Bhagat Singh Nagar (Punjab), Zone – I
6. Krishi Vigyan Kendra, Jalandhar (Punjab), Zone – I
7. Krishi Vigyan Kendra, Patiala (Punjab), Zone – I
8. Krishi Vigyan Kendra, Solan (Himachal Pradesh), Zone – I
Integrating Technologies and Best Practices

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9. Krishi Vigyan Kendra, Kullu (Himachal Pradesh), Zone – I
11. Krishi Vigyan Kendra, Howrah (West Bengal), Zone – II
12. Krishi Vigyan Kendra, Bokaro (Jharkhand), Zone – II
13. Krishi Vigyan Kendra, Samastipur (Bihar), Zone – II
14. Krishi Vigyan Kendra, Senapati (Manipur), Zone – III
15. Krishi Vigyan Kendra, Jorhat (Assam), Zone – III
16. Krishi Vigyan Kendra, Haridwar (Uttarakhand), Zone – IV
17. Krishi Vigyan Kendra, Gonda (Uttar Pradesh), Zone – IV
18. Krishi Vigyan Kendra, Basti (Uttar Pradesh), Zone – IV
19. Krishi Vigyan Kendra, Karimnagar (Andhra Pradesh), Zone – V
20. Krishi Vigyan Kendra, Chittoor (Andhra Pradesh), Zone – V
21. Krishi Vigyan Kendra, Ahmednagar (Maharashtra), Zone – V
22. Krishi Vigyan Kendra, Jaipur (Rajasthan), Zone – VI
23. Krishi Vigyan Kendra, Hanumangarh (Rajasthan), Zone – VI
24. Krishi Vigyan Kendra, Kheda (Gujarat), Zone – VI
25. Krishi Vigyan Kendra, Narsinghpur (Madhya Pradesh), Zone – VII
26. Krishi Vigyan Kendra, Kanker (Chhattisgarh), Zone – VII
27. Krishi Vigyan Kendra, Nuapada (Odisha), Zone – VII
28. Krishi Vigyan Kendra, Davanagere (Karnataka), Zone – VIII
29. Krishi Vigyan Kendra, Ernakulam (Kerala), Zone – VIII
30. Krishi Vigyan Kendra, Virudhunagar (Tamil Nadu), Zone – VIII

Agricultural Universities

A total of 10 Agricultural Universities participated in the exhibition to display the integration of technologies developed by their respective Universities with best practices. The Agricultural Universities which participated in the exhibition are listed below:

1. Punjab Agricultural University, Ludhiana (Punjab), Zone – I
2. Guru Angad Dev Veterinary Animal Science University, Ludhiana (Punjab), Zone – I
3. Sher-e-Kashmir University of Agricultural Sciences & Technology, Srinagar (Jammu & Kashmir), Zone – I
4. Bihar Agricultural University, Bhagalpur (Bihar), Zone – II
ICAR Institutes

A total of 10 ICAR Institutes participated in the exhibition to display the integration of technologies developed by their respective Institutes with best practices. The list of ICAR Institutes which participated in the exhibition is given below:

1. Central Institute for Research on Buffaloes, Hisar (Haryana), Zone – I
2. Central Institute of Post Harvest Engineering and Technology, Ludhiana, (Punjab) Zone– I
3. Central Potato Research Institute, Shimla (Himachal Pradesh), Zone – I
4. Directorate of Knowledge Management in Agriculture, New Delhi (Delhi), Zone – I
5. ICAR Research Complex for Eastern Region, Patna (Bihar), Zone – II
6. Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora (Uttarakhand), Zone – IV
7. Directorate of Sorghum Research, Hyderabad (Andhra Pradesh), Zone – V
8. Central Institute for Arid Horticulture, Bikaner (Rajasthan), Zone – VI
9. Central Rice Research Institute, Cuttack (Odisha) Zone – VII
10. National Bureau of Agriculturally Important Insects, Bengaluru (Karnataka), Zone – VIII

Innovation Market Place

Five SHGs, two agri-entrepreneurs and All India Coordinated Research Project on Home Science displayed their products in the Innovation Market Place. The details of SHGs and agri-entrepreneurs are given below:
1. Sukhmani SHG, Bahowal, Hoshiarpur, Punjab (Art work, stitching, tie & die)
2. Sadashiv Model SHG, Ramgarh Sikri, Hoshiarpur, Punjab (Fruits and vegetables preservation)
4. Gurukirpa SHG, Kalyan, Patiala, Punjab (Phulkari – traditional embroidery)
5. Mahalakshmi SHG, Dibku, Pathankot, Punjab (Diversified products- honey, pulse, rice and preservation)
6. Smt. Rampati, VPO Gujrani, Bhiwani, Haryana (Bajra Products)
7. Jyoti SHG, Samkhetar, Mandi, Himachal Pradesh (Products of millets, pulses, spices, flours)

The Exhibition and Innovation Market Place was visited by all the delegates of Conference, farmers and scientists. A large number of local visitors from Ludhiana including school children showed great interest in the exhibition and interacted with the concerned scientists/ agri-entrepreneurs to know the details of technologies / products displayed during the occasion. Besides, an animal show by GADVASU and farm machinery display by PAU and private partners was also organised as a side event.

Glimpses of Innovation Market Place
**Chairman**: Dr. K. Narayana Gowda, Vice Chancellor, UAS, Bangalore

**Panelists**: Dr. K.D. Kokate, DDG (AE), ICAR, New Delhi
Dr. M.L. Chaudhary, Vice Chancellor, BAU, Bhagalpur, Bihar
Dr. Ajay Vir Jakhar, Bharat Krishak Samaj, New Delhi

**Rapporteurs**: Dr. M.J. Chandregowda, Principal Scientist, ZPD, Zone- VIII, Bangalore
Dr. Lakhan Singh, Principal Scientist, ZPD, Zone-IV, Kanpur

**Presentations:**

1. **KVK and ATMA, Ahmednagar district (Maharashtra)**
   Technology Assistance and Up-scaling through Convergence – Cases of Fruit and Shoot Borer in Brinjal and Housing Management for Dairy Animals
   Mr. Deshmukh, Director, ATMA Maharashtra

2. **KVK and ATMA, Bareilly district (Uttar Pradesh)**
   Diversification of Sugarcane Based Production Systems
   Dr. Ajay Kumar Yadav, Dy. PD, ATMA District Bareilly, Uttar Pradesh

3. **KVK and ATMA, Aligarh district (Uttar Pradesh)**
   Convergence for Organizing Farmers and Farm Advisory Services
   Dr. V.K. Sisodia, PD ATMA District Saharanpur, Uttar Pradesh

4. **KVK and ATMA, Mandi district (Himachal Pradesh)**
   KVK-ATMA Convergence: A Case Study of Mandi district
   Dr. S.K. Thakur, Programme Coordinator, KVK Mandi, Himachal Pradesh

5. **KVK and ATMA, Bilaspur district (Himachal Pradesh)**
   Raising Small & Marginal Farm Income through Synergy & Linkages in Programmes
   Dr. S.K. Ghabru, Programme Coordinator, KVK Bilaspur, Himachal Pradesh

6. **KVK and ATMA, Jhalawar district (Rajasthan)**
   Functional linkages for Field Extension in Jhalawar District
   Dr. R.K. Bagri, Programme Coordinator, KVK Jhalawar, Rajasthan
7. **KVK and ATMA, Jorhat district (Assam)**  
Convergence for Extension Programmes and Activities in Jorhat District - A Success Story  
Dr. Imran Hussain, Extension Coordinator, ATMA Jorhat, Assam

8. **KVK and ATMA, Jehanabad district (Bihar)**  
Multifarious Convergence for Field Extension Programmes  
Mr. Mohammad Ismail, PD ATMA Jehanabad, Bihar

9. **KVK and ATMA, Katihar district (Bihar)**  
Capacity Building and Entrepreneurial Development of Farmers  
Dr. Divesh Kumar Singh, PD ATMA District Katihar, Bihar

10. **KVK and ATMA, Namakkal district (Tamil Nadu)**  
Convergence for Mitigating Drought through Integrated Farming System in Namakkal District  
Mr. A. Prabhakaran, PD ATMA Namakkal, Tamil Nadu

11. **KVK and ATMA, Puri district (Odisha)**  
Technology Dissemination Model for Coastal Fisheries  
Dr. M.P. Nayak, Programme Coordinator, KVK Puri, Odisha

A View of Technical Session
Agricultural Technology Management Agency (ATMA) is a registered society of key stakeholders involved in technology dissemination for sustainable agriculture development at the district level. It is a focal point for integrating Research and Extension activities and decentralizing day-to-day management of the public Agricultural Technology System (ATS). As a society, it would be able to receive and expand funds, entering into contracts and agreements and maintaining revolving fund accounts that can be used to collect fees and thereby recovering operating costs as well.

At district level, ATMA is increasingly responsible for all technology dissemination activities and would have linkage with all the line departments, research organization, non-governmental organizations and agencies associated with agricultural development in the district. Research and Extension units within the project district such as Zonal Agricultural Research Stations (ZRS) of SAUs and KVKs and the key line departments of Agriculture, Animal Husbandry, Horticulture and Fisheries, Forestry etc. are the constituent members of ATMA. KVKs being technically most sound and key partners at district level in agricultural research-extension programmes, play a vital role in the success of ATMA. Henceforth, to share some of the successful cases of KVK–ATMA convergence and to highlight the successful models employed and/or the problems being encountered, a specific session was organized in the 7th National Conference on KVK.

The session was conceptualized with an idea to share/ highlight the importance of “Convergence and linkages between KVK-ATMA programmes for field extension activities”. The session started with the welcome note from the Chairman. The importance and relevance of the session was briefly highlighted in his opening remarks.
In all, eleven best successful cases of field extension were presented by Project Director ATMA and or Programme Coordinators of KVK representing eleven districts of the country. A brief account of the deliberations of the session is as under:

**Technology Assistance and Up-scaling through Convergence-Cases of Fruit and Shoot Borer in Brinjal & Housing Management for Dairy Animals**

Mr. Deshmukh, Director, ATMA, Maharashtra explained the structure of ATMA, its stakeholders and the progress achieved in identification of Farmer Friends, formation of Commodity Interest Groups (CIGs) and identification of Farmers Advisory Committee (FAC) members. He emphasized that 22020 farmer’s friends and 33049 CIGs have been formed in the state. Apart this, there are 8973 FAC members at state/district/block level to strengthen the programme. A number of farmer’s organizations/NGOs are active partners in ATMA. Under public private partnership mode emphasis was laid on value chain development in maize, soybean, grapes, pomegranates & vegetables and integrated sugarcane development.

He highlighted the facilitating role of Farmers Organizations to achieve convergence at various levels and emphasized the role played by KVK in preparation of SREP, organization of commodity specific farmers’ groups and farm schools besides the normal activities provided in the ATMA cafeteria. Technologies provided by KVK like water traps for management of shoot and fruit borer in brinjal and loose housing concept for reviving dairy enterprise were also mentioned. He appraised the house that KVKs have been running Community Radio Stations (CRSs) with financial assistance from ATMA. ATMA and KVK have been getting benefit from each other not only in their regular activities but also in special activities planned and implemented for contingent situations.

**Case studies of fruit and shoot borer in brinjal and housing management for dairy animals:** Dr. Bhaskar Gaikwad, Programme Coordinator, KVK (PIRENS) Babhaleshwar, Ahmadnagar, Maharashtra presented significant achievements of KVK Ahmadnagar with ATMA linkages. KVK Ahmadnagar has taken up steps on the management of shoot and fruit borer in brinjal by the use of water traps and revival of dairy enterprise by integrating loose housing concept.

**Water traps for shoot and fruit borer management in Brinjal:** Brinjal contributes for 6% area and 4.5% to the total vegetable production in the district. However, heavy infestation of shoot and fruit borer causes 30 - 35% crop losses with 25000 - 27000 tons annual losses in production. The total economic loss is estimated up to Rs. 9 - 10 crores. Erratic use of strong and poisonous chemicals is further causing serious environmental and health hazards. Available solutions identified were installation of water traps integrated with botanicals, bio agents and need based chemicals for effective management of shoot and fruit borer.
KVK in convergence with ATMA conducted awareness programmes on ill effects of chemicals, OFTs and FLDs on farmer’s fields, radio talks, newspaper coverage, organization of field days and input supply from service centre of KVK. The results of KVK’s efforts were highly encouraging as it not only reduced pest damage to significant level but also minimized the input costs and helped in conservation of bio-diversity. There has been a steady increase in demand for supply of water traps and the technology has been adopted on 1500 ha area by 1025 farmers in the district. The introduction of traps eliminated two tonnes of toxic chemicals and thereby saved Rs. 20-25 lakhs annually.

Revival of dairy enterprise by integrating loose housing concept: Dairy gives regular returns to the small, marginal and rainfed poor farmers; however, they do not want to continue this enterprise due to low yield and quality of milk, more health problems and high cost of medicines due to ecto/ endo parasites as well as mastitis, problem of repeat breeding, low conception rate and more dry spell, improper feed and feeding management, high cost of production, unavailability of labour and unwillingness of youths and women for dairy enterprises due to continuous work for 14 - 16 hours a day and more drudgery.

KVK in collaboration with ATMA revived the dairy sector by up-scaling the loose housing concept through training programmes, exposure visits, demonstrations, exhibitions, seminars and printed literature to educate the farmers. Farmers were also supplied with chaff cutters, grass cutters, milking machines and new fodder crops were introduced to boost the dairy sector. An increase in income to the tune of Rs. 26000 (approximately) was observed apart from savings in labour, feed & fodder, reduced health related problems and reduced drudgery. Overall, net returns per month from a unit of upto 10 cows were worked out around Rs. 80000 per month.

KVK Pravara also started CRS in the year 2009 (first in Maharashtra with ATMA support) and 278 villages are covered in 5 tehsils benefitting 8.56 lakh farmers in the radius of 25-30 km. This resulted in faster dissemination of technology with minimum resources.

KVK- ATMA convergence resulted in location specific problem based activity focus wherein KVK became the active partner in the district for technology assessment, refinement and disseminations and KVK network increased in the district with the strengthening of FIAC.

Diversification of Sugarcane Based Production Systems: Dr. Ajay Kumar Yadav, Dy. PD, ATMA District Bareilly, Uttar Pradesh

Dr. Ajay Kumar Yadav, Dy. PD, ATMA presented a case study of diversification of sugarcane based production systems in Bareilly district achieved through KVK-ATMA convergence. In Bareilly district, rice- wheat and sugarcane based crop rotations are widely
adopted by the farmers. The system has sustained over for last many years and yield stagnation has been observed in this system resulting in overexploitation of soil resources, declining soil, crop and factor productivity, falling water table, development of secondary salinization, emergence of multi nutrient deficiencies, increased incidence of insect- pests, weeds and diseases.

In view of the multifaceted problems, KVK ATMA jointly made efforts to divert area from rice and wheat to sugarcane crop, promoted autumn planted sugarcane which yielded 25-30% more and 0.5 unit higher sugar recovery than spring planted sugarcane. KVK-ATMA also promoted sugarcane based inter crops like vegetables, fodder, spice and medicinal plants intercropping systems through trainings, field demonstrations, exposure visits, OFTs and FLDs, consultancy and advisory services, fields days, goshties, kisan melas, radio, TV, voice messages etc.

The sincere efforts resulted in increase in area under autumn sugarcane and sugarcane based cropping systems in the district. In future, emphasis will be on evaluation of economics of sugarcane based cropping systems in Bareilly district, exploring the possibilities of optimum combinations of crop and non cropping enterprises for improving the socio economic condition of farmers of Bareilly district and need to study the share of individual enterprises in the total farm income.

He also explained the way KVK is supporting the ATMA in capacity building of extension personnel and organization of field activities to promote sugarcane based production systems by replacing the traditional rice-wheat cropping systems.

**Convergence for Organizing Farmers and Farm Advisory Services:** Dr. V.K. Sisodia, PD, ATMA, District Saharanpur, Uttar Pradesh

Dr. V.K. Sisodia, PD ATMA made a presentation on convergence for organizing farmers and farm advisory services in Saharanpur district. He narrated the ATMA KVK linkages in the SREP/ DAAP preparation, training of ATMA functionaries, technical input from KVK in execution of field programmes, identification of field problems, feedback on the performance of technologies and evaluation of programmes. He further highlighted the contribution of KVK in Farmer-Scientist interactions, farm schools, training of farmers and FIG members, kisan gosthies, demonstrations, exposure visits and field days.

In addition, he elaborated the role played by the KVK in promoting basmati rice, participatory quality seed production, sugarcane + mustard intercropping and organic manure units in the district. The seed-cum-fertilizer drill technology promoted through KVK-ATMA linkage has led to a tremendous impact on enhancing fertilizer use efficiency.

ATMA also supported KVK in establishment of CRS. Live talks delivered through CRS covered 86 villages and 1.25 lakh farmers in the radius of 12 Km are being benefitted.
Dr. S.K. Thakur, Programme Coordinator, KVK Mandi presented the details of KVK - ATMA linkages in Mandi district of Himachal Pradesh. Dr. Thakur highlighted that after inception of ATMA in 2005-06, research & extension gaps were identified and prioritized based on participatory rural appraisal and analysis of existing farming systems. SREP for the district was henceforth prepared with active participation of KVK scientists. Some of the key issues addressed by KVK are IPM of fruit fly in tomato & cucurbits, utility of obnoxious weed flora as vermi-compost, management of root rot/wilt complex of rainy season pea, identification of profitable cropping pattern in mid hill zone and debility & death of cows due to haematuria.

Joint diagnostic visits by scientists of KVK and ATMA is a regular feature. Crop seminars in particular have been the major success in hilly district. KVK has played crucial role in up-scaling low-cost traps for eco-friendly management of fruit fly and low-cost vermicompost units. KVK also supported in the training need assessment of Farmer Friends and their capacity building. Besides regular activities like participation in each other’s meetings, convergence has been helpful in preparation of Block Action Plans, organization of exposure visits and capacity building of SHGs.

**Eco friendly fruit fly management:** Fruit flies cause huge losses to cucurbits and summer tomato, however, the existing recommendation fail to target the adults, eggs and developing maggots apart from high residual toxicity. KVK-ATMA demonstrated KVK developed traps with fruit fly specific para pheromones which resulted in significantly less fruit damage. Within three years, the technology horizontally spread in about 300 ha and the success is being replicated in other districts of the state by ATMA

**Low cost vermi-composting technology:** Cow and cattle dung piled in open heaps causes loss of plant nutrients and partially decomposed FYM used by farmers was resulting in many biotic stresses. The low cost vermi-composting technology was found highly suitable in the region and more than 70% of the farmers provided with the vermiculture and technical knowhow have successfully established their own units. About 6500 vermi-composting units have been established in the district in active partnership of ATMA.

It was emphasized that KVK-ATMA convergence is a short of symbiotic association which has resulted in practical and effective expansion of KVK outreach in the district, proper identification and understanding of actual problems and needs of the farming community and greater mobilization of rural youth and farm women towards self employment.
Dr. S.K. Ghabru, Programme Coordinator, KVK Bilaspur, Himachal Pradesh presented the activities that are being carried out through KVK-ATMA convergence with special emphasis on “Raising small & marginal farm income through KVK-ATMA synergy & linkage programs in Bilaspur district of Himachal Pradesh”. As majority area in the district is rainfed, emphasis was laid upon rain water harvesting for which a low cost working model was developed at KVK as a demonstration unit to visiting farmers.

Rain water harvesting structures

KVK also played an active role in dissemination of technology for popularization of protected cultivation. KVK-ATMA convergence played a vital role in diversifying the traditional maize-wheat cropping system and the area under vegetables and pulses has almost doubled during last few years. The farmers were also trained and mobilized to adopt other entrepreneurs like mushroom farming and pomegranate cultivation etc. The major areas like community sowing, dry sowing and management of stray cattle & wild animals have been resolved in collaboration with ATMA. Promotion of rain water harvesting, protected cultivation, diversification from maize-wheat to vegetables-pulses cropping system, seed production of pulses, soil health restoration through vermicompost units and organic farming, organization of pulse days and giving importance to secondary agriculture through entrepreneur-stakeholder meets have been carried out through convergence. Emphasis through KVK-ATMA convergence was especially laid on kharif
onion cultivation from setts, zimikand (elephant foot yam) cultivation, vermiculture, promoting secondary agriculture and women empowerment.

**Functional linkages for Field Extension in Jhalawar District:** Dr. R.K. Bagri, Programme Coordinator, KVK Jhalawar, Rajasthan

Dr. R.K. Bagri, Programme Coordinator, KVK Jhalawar presented the details of convergence including the receipt of Rs.90.18 lakh during 2011-12 from ATMA. Capacity building of farmers on high-tech horticulture, bee-keeping and animal husbandry and fuller utilization of soil testing facilities of KVK have been achieved through convergence. He also highlighted the details of various activities undertaken by KVK-ATMA linkages during 2011-12 and impact analysis of these activities by KVK. The incentive involvement of Krishak Mittrras for collection and analysis of soil samples was the innovative way to involve them as a link between scientists and farmers for effective dissemination of technologies. Apart from these joint diagnostic visits, organization of other extension activities like kisan melas, kisan gosthis were also taken up under convergence.

**Convergence for Extension Programmes and Activities in Jorhat District- A Success Story:** Dr. Imran Hussain, Extension Coordinator, ATMA Jorhat, Assam

Dr. Imran Hussain, Extension Coordinator, ATMA presented the contribution of KVK in technology assessment in winter rice (var Ranjit), rapeseed (var TS 36), vermi-composting, poultry, goat & pig breed up gradation and composite fish culture etc. Simple technological interventions by the KVK in R&D lead to greater impacts and easy acceptability by the farmers for example Kroiler birds which give 160-180 eggs was replaced by to Kalinga Brown which give 200-240 eggs and Setaria as fodder was not liked by goats was replaced by Kongo grass which was accepted by all animals. Winter rice variety Ranjit was demonstrated by the KVK and was accepted owing to its superiority over other prevalent varieties. Likewise rapeseed variety TS 36 and vermi composting technology were popularized through demonstrations and was easily accepted by the farmers owing to its yield superiority. Providing market driven extension services to farmers has been
emphasized in all ATMA-KVK linkages, which has yielded fruitful results as evident from increased incomes of farmers in various agri entrepreneurs.

Local goat breed was upgraded by Betal buck which was found superior to the local ones in all traits like productivity and economic returns. In case of piggery, Hampshire breed was found most suitable in the region and was hence popularized through demonstrations. Emphasis in case of fisheries was laid upon composite fish culture (3 IMC & 2 exotic) and the results of demonstrations were highly encouraging as evident from the incremental incomes received from fishery component. Emphasis was also laid on value addition activities like clean rice, molasses, paneer making, mustard oil etc. which also enhanced farm income.

A total of Rs. 253.47 lakhs was spent on various activities through KVK-ATMA convergence which resulted in additional farm incomes of Rs. 742.90 lakhs. He suggested to include KVK in BRC/FIAC as KVK scientist’s critical input is very vital to prepare effective block action plans.

**Multifarious Convergence for Field Extension Programmes:** Mr. Mohammad Ismail, PD, ATMA, Jehanabad, Bihar

Mr. Mohammad Ismail, PD ATMA at Jehanabad district, highlighted the effective role of KVK in preparation and updating of SREP, regular participation in GB/AMC/SAC meetings, capacity building of extension functionaries, farmer-scientist interactions, exposure visits and farm schools as centre of farmer to farmer technology transfer. *Kisan Choupals* on every Saturday, rabi and kharif mahotsava and *Mahila Ropanhar* (mechanization of transplanting operations) were the innovative means practiced for fast dissemination of farm technologies through KVK-ATMA convergence. Joint visits and joint publications have been the regular features of ATMA and KVK in the district. The successes achieved through KVK-ATMA convergence include enhanced seed replacement rate from 16.5 to 34%, increased yields of wheat & paddy, faster farm mechanization and women empowerment etc.
Glimpses of KVK-ATMA convergence for field extension programmes
Capacity Building and Entrepreneurial Development of Farmers: Dr. Divesh Kumar Singh, PD, ATMA, District Katihar, Bihar

Dr. Divesh Kumar Singh, PD, ATMA elaborated the ATMA-KVK efforts towards agri-preneurship development in the Katihar district. He highlighted the prospects and problems of the district and efforts made by KVK in identifying and resolving the niche and sector specific problems for enhancing the productivity of the agriculture with the help of KVK involvement. In the various activities of ATMA and KVK the lead role performed by each partner in various activities were described and the details of various activities was presented. KVKs played lead role in technical aspects like trainings, demonstrations, publications etc. while ATMA played the lead role in organization of kisan gosthis, kisan melas, village level trainings and demonstrations etc. As many as 240 village level trainings; 154 block level trainings; 95 district level trainings; 66 state level trainings; 43 inter-state level trainings; about 1000 demonstrations in agriculture/ animal husbandry sectors; 80 field days; 12 farmer scientist interactions; 8 kisan melas; 41 exposure visits; and 134 farmer field schools have been jointly organized by KVK and ATMA. Emphasis was also laid upon empowerment of women wherein 598 SHGs were formed of which 119 are for rural women. Some of the innovative activities like entrepreneurial development among prisoners and landless, promotion of SRI in paddy, establishment of implement bank, promotion of bio-fertilizers, promotion of IPM and establishment of nursery units were taken up through convergence. The joint efforts of KVK-ATMA have lead to increased productivity of crops across the locations.
Convergence and Linkage between KVK-ATMA Programmes—Best Successful Cases of Field Extension

Technical Session – 1

Establishment of implement bank and nursery by joint efforts of ATMA & KVK

Convergence for Mitigating Drought through Integrated Farming System in Namakkal: Mr. A. Prabhakaran, PD, ATMA, Namakkal, Tamil Nadu

Mr. A. Prabhakaran, PD ATMA highlighted the major components under key sectors of agriculture, horticulture and animal husbandry in the district. He presented the contribution of ATMA-KVK in the agricultural development of the district. He explained how the intensive goat rearing, fodder production and management of mealy bug in tapioca through large scale production-supply-release of parasitoid (*Acerophagus papaya*) have given a big boost to the agricultural economy of the district. A large number of trained farmers have now taken these activities as small entrepreneurs. About 2600 farmers were benefitted through parasitoid supply covering an area of around 7000 hectares. Impact of farmers’ exposure visit to Haryana in creating mass awareness and mobilizing community action for fly control through safe disposal of dead poultry birds, use of bio-spray and incinerator were highlighted. Majority of the poultry farms in the district have now constructed the dead bird disposal pits which has considerably reduced the hazards in poultry. Value addition of millets and milk, establishment of a community radio station and radio jockey training programmes for content creation and editing were the other

Intensive goat rearing Commercial layering in poultry
achievements of KVK-ATMA convergence. Farmer’s partner directory including the contact details of all the stakeholders was also published. KVK was involved as an active partner right from selection/placement of BTMs, farmer’s friends at district level to their trainings/capacity building etc. A regular monthly review meeting of BTMs is key feature of KVK-ATMA convergence. Publicity Vans and cultural programmes were used to create mass awareness among the farmers.

Training of farmers on mass multiplication of parasitoids

**Technology Dissemination Model for Coastal Fisheries:** Dr. M.P. Nayak, Programme Coordinator, KVK Puri, Odisha

Dr. M.P. Nayak, Programme Coordinator, KVK, Puri highlighted the institutional and functional linkages between ATMA and KVK with special emphasis on Coastal fisheries in Odisha - A model of KVK – ATMA linkage. Feed forward provided by the KVK to ATMA and the utility of feedback received from ATMA in preparation of action plan of KVK were emphasized.

Researchable issues identified and prioritized were: i) low fish yield due to single cropping pattern of pisciculture by using small size fish seeds (fries, early fingerlings/fingerlings) as stocking materials; ii) low fish yield due to imbalanced artificial feeding; iii) low fish yield due to lack of prophylaxis & disease management; iv) low income from backyard pisciculture particularly from very small size ponds; and v) low income from shrimp culture due to outbreak of viral diseases.

To combat these issues, the interventions undertaken by the KVK included vocational trainings of fish farmers/farm women/rural youth & extension workers; front line demonstrations on latest technologies; on-farm testing for location specific problems; participatory fish farmers group interaction for problems identification & its prioritization; media coverage of modern technologies on pisciculture; publication of Odiya literatures on different aspects of modern aquaculture; developing personal contacts by farm visits,
telephone calls/KMAS; and facilitating formation / reorganization / strengthening of different service provider groups and linkages with line-department officials.

Panelists Remarks

Dr. M.L. Choudhary acknowledged the efforts of KVKs but emphasized the need to strengthen them to perform still better. Developing each village into a Knowledge Centre is an immediate need and is possible through strategic and effective ATMA-KVK convergence. As the number of farmers and area to be covered in each district is huge, farmer-to-farmer extension needs to be institutionalized through ATMA-KVK convergence, he remarked. Planning must be bottom-up and involvement of farmers in this process is very crucial and promotion of market-led extension needs special attention. SAUs need to support the capacity building of ATMA and KVK personnel, while ICAR should organize pre-seasonal interfaces with DAC in which Vice-Chancellors of SAUs must be involved for planning of KVK-ATMA convergence strategies. He further stressed that knowledge empowerment of farmers is necessary for initiating bottom-up approach and farmer-to-farmer extension. Besides, new ICT tools should be used for market intelligence so that bargaining power of farmers is improved.

Dr. Ajay Vir Jakhar observed that the fund flow from ATMA to KVKs is highly skewed and varies from district to district and urged for uniformity in fund flow for all the KVKs. He urged that the funds available with ATMA must be provided to KVKs directly and expressed concerns that the ATMA meetings are not being held systematically and the deliberations lack seriousness as they do not discuss the major issues in detail. There cannot be any alternative to public extension system, but unfortunately the system do not provide sufficient funds for extension activities as most part of the budget goes for salary. Therefore, it is essential that the public and private extension systems must work synergistically to achieve the desired goal of increasing farmers’ income. He commented that the development personnel should be trained in communication skills for effective
delivery of knowledge to the farmers. The Governing Body Meetings of ATMA in many districts are organized casually which is a matter of concern. He was happy to hear from many KVKs about their concern over farmers’ income rather than farm productivity. However, he was of the opinion that farmers should be well informed about different development schemes of the central and state government. At last, he opined that though good models of Private Sector Extension existed but, it could not be a substitute of Public Sector Extension. The later has to play an important role in Indian scenario.

Dr. K.D. Kokate, DDG (Agricultural Extension), ICAR appreciated all the presentations for bringing out various dimensions of convergence from across the country and from different stakeholders like Directors, PDs and Coordinators of ATMA and Programme Coordinators of KVKs. The convergence linkage and guidelines circular issued by DAC needs a revisit and some of the proposed changes are quarterly meetings, earmarking of funds, visit of ATMA staff to the cluster villages of KVKs and ATMA sponsorship for Technology Weeks being organized by KVKs. The DEEs of all the SAUs were requested to study the SREPs and CDAPs of all the districts and also guide the KVKs in developing action plans.

For better convergence and effective functional linkage, KVK and ATMA should meet quarterly to review the progress and plan accordingly. KVK should organize need based capacity building programmes for district level development department personnel, members of Block Technology Team/ Block Technology Managers and Subject Matter Specialists of ATMA. The development departments may request for additional training if required. SAUs and ICAR will identify senior experts at district level for technological backstopping to KVK and ATMA. Funds may be earmarked for such experts under ATMA scheme. KVK will prioritize district technological intervention along with SAU and ICAR. KVKs are implementing their mandated activities in cluster village approach. KVKs will provide the list of cluster of villages and plan of activities to the development departments so that KVK activities are supported by the government schemes and a model of extension is developed. PD, ATMA and his team along with PC, KVK should visit these villages so that they gain the first hand experience on performance of the demonstrated technologies. ATMA may sponsor the Technology Week organized by the KVK which is a focused programme with live demonstrations at KVK farm and interaction of farmers with all the stakeholder agencies for technology application. KVK may also provide agriculture technology updates and contingency plans in case of disasters and devastations. Directors of Extension Education should provide technological inputs and advice for updating SREP and CDAP and accordingly the District Agriculture Action Plan should be prepared. Mandate of KVK should not be diluted and the KVKs should not be involved in Kisan Call centres, Community Radio, etc. without providing additional manpower and financial support.
Chairman’s Remarks

The chairman of the session thanked all the presenters for throwing light on vital issues related to the convergence and its importance for the agricultural development at the district level. He desired that the process of convergence in these successful cases needs to be documented and shared with all the KVKs and ATMAs for further up-scaling. The chairman also reiterated that as the ultimate aim of convergence is to help farmers in improving their livelihood, ATMA and KVKs must be prepared to go extra-mile and work together. All the organizations working in coordination and co-operations should respect the work and activities of each other as the ultimate objective of all the development departments is to serve the farming community in better way. Working in harmony and convergence will increase the efficiency and effectiveness of all. He endorsed the points mentioned by all the panelists of the session.

Recommendations

• The success achieved in the institutional and functional linkages between ATMA and KVK need further catalyzing it for nation-wide up-scaling.
• The successful process and methodological aspects of KVK-ATMA convergence should be documented elaborately and made available to all the stakeholders for replication as per the needs of the district.
• ATMA-KVK convergence is essential for developing each village into Knowledge Centre. As the number of farmers and area to be covered in each district is huge, farmer-to-farmer extension needs to be institutionalized through ATMA-KVK convergence.
• As there cannot be any substitution to public extension, public and private extension systems must work synergistically to achieve the welfare of all categories of farmers.
• Feed forward provided by the KVK to ATMA and the utility of feedback received from ATMA in preparation of action plan of KVK has been a major gain of the convergence and needs to be harnessed appropriately.
• Fund flow from ATMA to KVKs is highly skewed and varies from district to district and hence there is a need for uniformity in fund flow to all the KVKs and must be provided to KVKs directly.
• Planning must be bottom-up and involvement of farmers in this process is very crucial, particularly in the promotion of market-led extension.
• Pre-seasonal interfaces between ICAR and DAC must include Vice-Chancellors of SAUs so that issues related to convergence can be discussed.
• Technical backstopping of KVK and ATMA by the ICAR institutes and SAUs needs special attention.
• There is a need for revisiting the joint circular on convergence to make the convergence process more operationally feasible. Some of the proposed changes include quarterly meetings, earmarking of funds to KVKs, visit of ATMA staff to the cluster villages of KVKs and ATMA sponsorship for Technology Weeks being organized by KVKs.
• The Directors of Extension Education (DEEs) of all the SAUs must consult the SREPs and DAAPs of all the districts and guide the KVKs in developing their action plans.
• KVKs should be guided by DEEs and ZPDs and be given operational freedom and flexibility for managing and conducting Research-Extension-Farmer (R-E-F) linkage activities under ATMA without diluting the mandated activities of KVKs.
• The successful agri-entrepreneurs could be used for mobilizing other farmers through PPP mode jointly by KVK-ATMA as per provisions in the ATMA scheme.
• Orientation of Farmer Friends (FF) & Block Level Farmers Advisory Committee Members (BFACs) may be done by KVKs on regular basis.
KVK's Best Practices and Innovative Approaches for Out-scaling Technologies

Chairman : Dr. O.P. Gill, Vice Chancellor, MPUA&T, Udaipur

Panelists:
  : Dr. Sudhir Bhargava, Member, Governing Body, ICAR
  : Dr. Krishna Srinath, Director, DRWA, Bhubaneswar
  : Dr. J. V. Patil, Director, DSR, Hyderabad
  : Dr. T. Mahapatra, Director, CRRI, Cuttack
  : Dr. S. Prabhu Kumar, ZPD, Zone-VIII, Bengalore
  : Dr. J.S. Chauhan, Director, Rape Seed Mustard Research, Bharatpur
  : Swami Sadananda Ji, R.K. Mission Neempith, West Bengal

Rapporteurs:
  : Dr. Attar Singh, Principal Scientist, Zone-IV, Kanpur
  : Dr. P.P. Rohilla, Senior Scientist, ZPD, Zone-VI, Jodhpur

Presentations:
1. Technological Interventions for Flood Prone Areas
   Dr. A.K. Dubey, KVK, Kushinagar (Uttar Pradesh)

2. Rehabilitation of Sodic Soils and Development of Related Farming Systems
   Dr. A.K. Srivastava, KVK, Pratapgarh (Uttar Pradesh)

3. Integrated Water Management in Vegetables - A Unique Example of Public Private Community Partnership
   Dr. S. S. Rathore, KVK, Jaipur (Rajasthan)

4. Integrating Technologies for Groundnut and Cotton Crops in Saurashtra Region of Gujarat State
   Dr. B. B. Kabaria, KVK, Rajkot (Gujarat)

5. Integrated Farm Development through Community Resource Centres
   Dr. P. Alagesan, KVK, Erode (Tamil Nadu)

6. Innovative Approaches for Sustainable Farming in Western Ghats
   Dr. Hemant Hegde, KVK, Uttara Kannada (Karnataka)
7. Entrepreneurship Development of Tribal Farmers through Quality Seed Production Programme  
   Dr. Vijay Kumar Verma, KVK, Betul (Madhya Pradesh)

   Dr. N. C. Sahu, PC, KVK, Dakshin Dinajpur (West Bengal)

9. Integrated Agricultural Development through Application of Best Practices  
   Dr. A. K. Singh, KVK, Ranchi (Jharkhand)

10. Water Harvesting for Multiple Uses  
    Dr. Shabir Hussain Wani, KVK, Senapati (Manipur)

11. Crop Diversification in Silt Deposited Areas of Assam  
    Dr. Kameswar Das, KVK, Chirang (Assam)

12. Integration of Technologies for Disease Management in Horticultural Crops  
    Dr. S. K. Gupta, KVK, Solan (Himachal Pradesh)

13. Blending Technologies for Sustaining Natural Resources  
    Dr. A.S. Dahiya, KVK, Panipat (Haryana)

14. Crop Diversification, Varietal Replacement in Gram and Nutrient Management in Rice  
    Dr. (Mrs.) Dhanalakshmi, KVK, Kurnool (Andhra Pradesh)
THE session was conceptualized with an idea to share/highlight the importance of “KVK’s Best Practices and Innovative Approaches for Out-scaling Technologies”. The session started with the welcome note from the Chairperson. The importance and relevance of the session was briefly highlighted in the opening remarks by Dr. O.P. Gill. In all, fourteen case studies of KVK’s Best Practices and Innovative Approaches for out-scaling technologies were presented by Programme Coordinators of various KVKs representing fourteen districts of the country. Best practices and technologies can sustainably increase productivity and leverage agriculture poverty reduction potential if these are shared, deployed and adapted across the locations with specific minor modifications. Knowledge sharing mechanisms by KVKs are essential for addressing existing implementation gaps, deploying new technologies and to ensure the use of tools most adapted to their situation across the country. However, knowledge sharing mechanisms have often been neglected owing to lack of attention to this sector. At the same time, public support for agricultural development has also declined, raising questions about how research can address the need of farmers in different geographies. Scaling up best practices, deploying innovations and sharing knowledge has to become priorities for the future agriculture agenda, with complementary role of KVKs in achieving sustainable agriculture through its best practices and innovative approaches for out-scaling technologies. A brief account of the deliberations of the session is as under:

Technological Interventions for Flood Prone Areas: Dr. A.K. Dubey, KVK, Kushinagar (Uttar Pradesh)

Dr. A.K. Dubey, Programme Coordinator, KVK, Kushinagar in his presentation on “Technological Interventions for Flood Prone Areas” emphasized upon increasing production of major crops (Rice, Wheat and Sugarcane) of the area in flood prone localities especially by utilizing different agro-technologies like DSR, paddy cultivars cum fish culture,
farm mechanization, Zero Till wheat, inter-cropping in sugarcane for higher returns per unit area. He apprised the audience about the major problems like low yield of rice due to submerged conditions clubbed with no use of stagnant water for commercial enterprises, low yield of wheat due to delayed sowing, low economic return from sugarcane crop and lack of farm mechanization being faced by the farmers.

He told that with the introduction of direct seeded flood tolerant varieties of paddy (Rajshree, Swarna Sub-1) by KVK, the recorded average yield was 56.5 q/ha with a net profit of Rs.45833/- per ha compared to the traditional varieties and methods. Apart, integrating aquaculture with agriculture also assured higher productivity and year round employment opportunities for farmers. Fish culture in rice fields offer one of the best means of “contemporaneous production of grain and animal protein on the same piece of land” and is one of the most ideal methods of land use. KVK has introduced Rajshree variety of paddy suitable for rizipisciculture, with an average yield of 25 q/ha, grown in combination with Katla, Rohu and Nain species of fish with an average yield 3.20 q/ha. It was observed that an additional income of Rs. 32000/ ha was obtained with this single intervention by the KVK.
Dr. Dubey also informed that due to submerged conditions in the cultivated fields, there were also areas in the district which usually come under seasonal drains and become unproductive during flooding season. Also, there was a lack of productive fish species for the ponds due to which, the ponds were left abandoned. Popularization of productive species of fishes by KVK resulted in large scale adoption and the abandoned farm ponds were renovated and fingerlings of improved species of fishes like Katla, Rohu and Nain were added in these ponds and the horizontal spread of composite fish culture was observed in around 650 hectares of area.
Harvested fish

Seasonal drains

Renovation of old pond

Packing of fingerling at hatchery
Dr. Dubey added that for enhancing the productivity and sustainability of the rice-wheat system without seriously affecting the natural resource base and the environment, several resource conservation technologies like zero tillage and zero till seed cum fertilizer drill etc. have been developed. These technologies not only resulted in increased yields but also ensured timely sowing, lowered costs, saved soil moisture and reduced weed menace.

The adoption of zero till method is becoming popular at an exponential pace. During the year 2011-12, the number of zero till service providers in the district has increased to 95 and area cultivated was 3325 ha. Mobilization of farmers for custom hiring for farm mechanization was also highlighted by Dr. Dubey which resulted in remarkable impact. He highlighted the problem of low economic returns of sugarcane cultivation in the region owing to lack of awareness of technology and faulty planting methods. The farmers were advised to go for Intercropping in autumn sugarcane (variety CoSe 96436 and
CoSe 1424) with garlic (Variety G -50) and onion (Variety AFLR) to increase cropping intensity and get higher monetary returns. The practice of growing sugarcane with garlic and onion has gained popularity among the farmers of the district and the area under these two practices has increased to 250 and 170 ha, respectively.
Apart from these two interventions, cowpea (variety CP-4), lentil (variety NDL-1) and toria (varieties PT-303, PT- 507) were also introduced as intercrop with sugarcane which also gained popularity amongst the farmers as evident from the large scale adoption of these practices. Dr. Dubey also told that KVK made efforts to replace the furrow method of planting of sugarcane with improved trench method of planting which gave better results than the traditional method of planting of sugarcane. He also informed the audience that in order to improve the economy of the farmers, two improved maize varieties Shaktiman -4 and  D-900 M Gold  were introduced in the district which are suitable for winter growing which resulted in higher yields and per unit net returns.
Sugarcane planted by furrow method

Standing crop planted by furrow method

Sugarcane planted by trench method

Standing crop planted by trench method

Introduction of winter maize
In the end Dr. Dubey discussed the impact of various technologies being introduced by the KVK in the district which not only resulted in enhanced production/productivity of rice, wheat and sugarcane but also encouraged farmers to adopt other profitable practices for overall enhanced profitability.

**Rehabilitation of Sodic Soils and Development of Related Farming Systems: Dr. A.K. Srivastava, KVK, Pratapgarh (Uttar Pradesh)**

Dr. A.K. Srivastava, Programme Coordinator, KVK, Pratapgarh in his presentation on “Rehabilitation of sodic soils and development of related farming systems” deliberated upon various modules for rehabilitation of sodic soils for three categories of soil i.e. C (pH >10), B (pH 8.9-10.0) and B⁺ (pH 8.2-8.9). The emphasis was laid upon reclamation through Gypsum @ 15 ton/ha, residue management, green manuring, laser land leveling, press-mud @ 4 ton/ha, Sesbania co-culture etc.

Residue management

ZT-wheat + mulch

ZT-wheat
Owing to KVK’s efforts the technologies were adopted on a large scale in the district and farmers were able to harvest good crops and earn higher returns per unit area after rehabilitation of sodic soils. Per capita income increased from Rs 4012 to Rs 5747 per annum and overall household income increased from Rs 22,580 to Rs 27,352 per annum.

Adoption of technologies demonstrated by KVK Kushinagar

<table>
<thead>
<tr>
<th>Specific technology</th>
<th>No. of farmers</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero tillage wheat</td>
<td>9864</td>
<td>18430</td>
</tr>
<tr>
<td>Direct seeded rice</td>
<td>546</td>
<td>136</td>
</tr>
<tr>
<td>Mustard Zero tillage</td>
<td>110</td>
<td>75</td>
</tr>
<tr>
<td>Pea Zero tillage</td>
<td>85</td>
<td>35</td>
</tr>
<tr>
<td>Maize (High quality protein maize)</td>
<td>580</td>
<td>410</td>
</tr>
<tr>
<td>Laser land leveller</td>
<td>680</td>
<td>340</td>
</tr>
<tr>
<td>Residue management</td>
<td>3286</td>
<td>7845</td>
</tr>
<tr>
<td>Sesbania co-culture</td>
<td>134</td>
<td>38</td>
</tr>
<tr>
<td>Aonla + Zimikand</td>
<td>280</td>
<td>425</td>
</tr>
</tbody>
</table>
Integrated Water Management in Vegetables - A Unique Example of Public Private Community Partnership: Dr. S. S. Rathore, KVK, Jaipur (Rajasthan)

Dr. S.S. Rathore, Programme Coordinator, KVK, Jaipur in his presentation on “Integrated water management in vegetables - a unique example of public private community partnership” emphasized upon participatory efforts by different organizations for the betterment of the farming community. Intensive awareness for water conservation through use of mini sprinkler/ drip irrigation, use of mulching, integrated water management approach through public private community partnership, selection of the farmers, trainings, conducting FLDs of vegetables, use of plastic mulching, farm advisory services during the crop season and promotion of post harvest technologies were taken up by the KVK, while different organizations as Coca Cola, Dhanuka and Nunhems collaborated for financial and technical support for up-scaling the technologies. He added that over the years due to frequent incidence of drought and over exploitation of ground water, the water level had been declining in many part of Chomu tehsil. He informed that such situation was most alarming in Kaladera and its surrounding area, which are located in 10 km radius of KVK Chomu and drip-irrigation was found as the only effective tool to maintain optimum soil moisture for crop production and avoid wastage by delivering precise amount of water to the root zone. Considering the situation, the management options decided by KVK included intensive awareness for water conservation, use of mini sprinkler / drip irrigation, use of mulching, and integrated water management approach through public private community partnership.

For the successful implementation of the programme, the following organizations were identified:

- Hindustan Coca-Cola Beverages Pvt. Ltd. - The official of this company agreed for financial support to the farmers for establishment of drip irrigation and support to KVK for extension activities to create awareness.
- Dhanuka Agritech Ltd has agreed for technological backup of IPM Technology with demonstration of eco-friendly pesticides & training to the farmers.
- Nunhems has agreed for contract farming of onion, support through provision of quality seed, mulching martial & technical back up.

KVK, Chomu organized the training of farmers to motivate for drip irrigation system in vegetable crops. To overcome the financial problems for establishment of drip irrigation system, Hindustan Coca-Cola Company agreed to provide assistance to farming community and joined hands with KVK in public private partnership for promotion of new technology. The assistance for installation of drip system as 70% Government subsidy under NHM, 20% assistance from Coca-Cola and 10% farmers’ share. Now the subsidy is 90% & remaining part is shared by Coca-Cola & farmers on 75%-25% share basis, respectively.
The role of Dhanuka Company was to sponsor IPM technology, demonstration of eco friendly product and educating farmers by regular supervision through field-assistance.

**Intervention of KVK**: Dr. Rahtore apprised that the KVK was playing main role as a facilitator and provider of technical guidance to the farmers by conducting training programme, FLDs and farm advisory services. KVK as a mediator among the private partner and farming community for effective implementation of the programme was the key to the success of the programme.

**Contract farming**: To overcome problem of marketing of the produce, KVK joined hands with Nunhems Private Limited (vegetable seed producing company) for contract farming. It was agreed upon that company will provide seed, mulching material and regular supervision of the crop during crop season and will buy onion bulbs @ Rs. 10/- per kg. This programme was started in 2009 and continued for 3 years, which resulted in assured marketing and income to the farmers.

**Outcome**: Through the public-private partnership initiated by KVK-Chomu, the scenario of vegetable growers was changed by using high-tech horticultural technology in the area. The farmers were benefited directly through this programme with a remarkable horizontal spread of the technology in the whole district covering an area of 4500 ha. In
future it has been planned to include about 1500 farmers and to play a vital role in water conservation technologies i.e. drip irrigation system in the Jaipur district.

**Impact of Programme:** The results were quite encouraging as it resulted in 65-70% water saving, 25-40% increase in cultivable area, decreased labour, inputs & production costs and 35-50% increased productivity. Farmers fetched Rs. 16.0 lakh in 2008-2009, Rs. 38.0 lakh in 2010 from Nunhems Pvt. Ltd. by contact farming of onion and in 2011, farmers earned Rs. 85.0 lakh from the seed production programme. The impact was remarkable from the figure that about 70 villages were covered under this scheme and the adoption of drip irrigation enhanced farm incomes by 20-25% and farmers have started producing high value cash crops like capsicum, cucumber, and hybrid tomato (by staking). Overall, this public private participatory effort is a unique success story for replication across the locations for the betterment of farming community.

**Integrating Technologies for Groundnut and Cotton Crops in Saurashtra Region of Gujarat State:** Dr. B. B. Kabaria, KVK, Rajkot (Gujarat)

Dr. B. B. Kabaria, Programme Coordinator, KVK, Rajkot delivered presentation on “Integrating Technologies for Groundnut and Cotton Crops in Saurashtra Region of Gujarat State”. His deliberation was focused on package of practices of groundnut for higher production in rainfed area and utility of water during dry spell, use of rain gun or sprinkler at critical stages such as flowering, peg formation and pod development and intercropping of groundnut with castor or cotton under rainfed farming for better crop sustenance. He apprised the audience that groundnut and cotton were the major crops of Gujarat state occupying 20 and 26 lakh hectares of area, respectively. The area, production and productivity of groundnut and cotton were higher in Saurashtra region than the average of Gujarat and India. Farmers of this region are adopting the recommended technologies of the university and integrate the technologies suitable in the region for higher return in cotton and groundnut. He deliberated in detail about the various technologies being practiced by the farmers and their impacts on yield and economics of these crops.

**Integrated Farm Development through Community Resource Centres:** Dr. P. Alagesan, KVK, Erode (Tamil Nadu)

Dr. P. Alagesan, Programme Coordinator, KVK, Erode, Tamil Nadu made presentation on “Integrated Farm Development through Community Resource Centers”. His deliberation was mainly focused on technologies being provided by these resource centers like management of cattle resources with simple mechanization, reduction in chemical fertilizer usage, reduction in investments towards the purchase of external inputs, creation of community based institutions/ user group, effective utilization of farm and home
resources, livelihood security through group based approach, soil and water conservation through watershed approach, animal health promotion and welfare, commercial nursery promotion, scientific grain storage and development of Information, Education and Communication (IEC) materials. Dr. Alagesan also informed that a knowledge management system was developed by KVK and community managed resource centre (CMRC) is its major component. CMRC is a non-profitable local level institution managed by the community based organizations for sustainable development which provide information, technology and services to community based organizations and individuals with the support of KVK, Erode. The structure of CMRC has been depicted in following figure.

Dr. Alagesan highlighted the services provided by KVK including information dissemination, facilitation of quality seeds and saplings, production of bio-inputs, support services in farm mechanization, value addition and marketing, credit linkages and formation of CBOs. Presenting the salient achievements of the KVK, he informed that effective utilization of farm and home resources was possible through integrated farm development system. Livelihood security through group based approach was one of the main focuses of the KVK. Soil and water conservation through watershed approach, animal health promotion and welfare, commercial nursery promotion, scientific grain storage and development of IEC materials were among other salient achievements. He told that the Integrated Farm Development (IFD) is an innovative concept to improve farm productivity in a sustainable manner by integrating farm resources and recycling various farm and
home waste. The IFD is location specific, technically feasible, economically viable, eco friendly and easily replicable and is required on the rationale that there is a lack of awareness among farmers on utilizing the farm and home wastes. In view of these constraints, the KVK organized its interventions through CMRC to address the problems of the farmers and the farmers were encouraged for participatory initiatives and innovations. The documentation of the success was done by publishing the IEC materials and to ensure success, linkage with appropriate institutions was taken up. The main components of the IFD were cattle shed with urine collection pit, bio gas unit, vermi compost unit, bio growth promoter, crop pest repellent, green fodder/ Azolla, kitchen garden, on bund biomass plantation, grain storage, rain water harvesting structures, apiculture and ecological sanitation.

A four steps process of the farmer’s innovations was discussed by Dr. Alagesan. In the first step, cow dung is collected in the first compartment and mixed with water. The second step comprised of filtration which takes place in second compartment. The filtrated solution is allowed to the next stage and mixed with cow urine. The solid matter (sediments) used for biogas production. In the third step, clear solution is collected in and allowed to
Integrating Technologies and Best Practices

Model village - MP Doddi
before intervention

Model village - MP Doddi
After intervention

Device to manage cattle resources with simple mechanization
ferment. Jaggery is added for inducing the fermentation process. In the final step, enriched solution is collected in other compartment and is used for field application through drip system. The system was found to be easy to adopt with drip irrigation system. The application of material in the soil resulted in reduction in soil pH from 8 to 7.3 and enhancement of yields.

Construction is locally available material

Ripened fruits were dipped in clear organic solution

Low cost model construction is in progress

The results of the programme were encouraging as the chemical fertilizer usage was reduced by 43.53%, investments towards the purchase of external inputs were reduced and resulted in established community based institutions/ user group.
Churn with Drillers

Connecting with venturi

Same model construction

Liquid is directly connected with foot valve

Poultry manure is dipped in water

Filtered solution
Innovative Approaches for Sustainable Farming in Western Ghats: Dr. Hemant Hegde, KVK, Uttara Kannada (Karnataka)

Dr. Hemant Hegde, Programme Coordinator, KVK, Uttara Kannada (Karnataka) made a presentation on “Innovative Approaches for Sustainable Farming in Western Ghats”. Some of the technologies deliberated by him included high density banana planting which resulted in two fold increase in yield, multistoried cropping system with perennials nutmeg, innovation in labour saving in dairying and monkey scaring system. He told that land use type was the main criteria for selection of crops for cultivation mainly in moist valleys. Narrow valleys sloping from West to East are used for cultivation of arecanut and spices, while broad valleys preferably sloping from North or South are considered appropriate for paddy cultivation. For most effective utilization of light, space, soil and moisture, high density multistoried cropping of arecanut, black pepper, banana/cocoa, cardamom, coconut, nutmeg, jackfruit, and mango is practiced. For increasing the cropping intensity and gross returns, a three tier system of cropping with arecanut & blackpepper, banana/cocoa and cardamom is followed. For enhancing soil fertility, organic farming is common with judicious use of green manure, dry mulch, FYM and recycling of residues. Dr. Hegde also presented the glimpses of some farmer innovations, which are as under:

- Dr. Abdul Rauf Sheikh considered as a farmer magician developed the system of high density banana plantation for profit maximization. The recommended spacing in banana is 6’ x 6’ with a plant density of 3025 plants per ha with average yield of 30 t/ha. The high density banana plantation innovative method developed by him at a spacing of 7’ X 4’ X 3’ in paired rows resulted in a plant population of 6600 plants per ha with average yield of 70 t/ha.

- Sh. Poornanad Bhat, another progressive farmer, was adding flavor to agriculture through multistoried cropping system with perennials. In an area of 7.2 ha, he is growing arecanut, blackpepper, nutmeg (seed) and mace. He is getting a gross income of Rs. 12.16 lakh and a net income of Rs. 10.67 lakh per ha.

- In dairy technology, Veda & Sitaram Hegde were pioneer in resource management. They developed innovation in labour saving in tying & untying, washing and milking. They also developed innovative tools for mopping and collection of cow dung. Effective utilization of dairy waste was carried out through utilization of animal excreta for bio gas production and the slurry was transported to the fields.

- Ms. Bhagirathi Bhat from village Karwa was ensuring livelihood security through value addition of minor fruits. She is preparing different products from minor fruits with value addition. She is producing kokum syrup & kokum kadi from kokum fruits, aonla juice with and without sugar, lemon ginger juice, lemon honey juice, pineapple juice, honey etc. The other products prepared by her include brahmi juice, doob grass juice, tender mango (appe midi) pickle, tender bamboo pickle. Her net income is Rs. 35000/- per month.
Dr. Hegde also highlighted the innovations of KVK which include *jalodhar mapak*, biodigester, technologies for blackpepper, home generated fertilizer and monkey scaring system. He added that *jalodhar mapak* was a low cost instrument fabricated using local materials useful for monitoring of shallow water table and designing and maintenance of drains. Bio-digester is beneficial in the sense that it promotes plant growth, residue free...
Preparation of kokum syrup and does not affect human or animal health adversely. Further it has anti feedant properties, a very good ovicide, larvicide, repellent and causes insect sterility and retards moulting. For its effective use, he recommended its spray @ 1:9 or its soil application @ 1:5 materials: water ratio.

He told that in order to mitigate the non availability of quality planting material and high cost of production of black pepper, KVK has developed Closed Media Sachet (CMS) method of plant propagation for rooted cuttings. The impact was so marked that most of the farmers have adopted this technology. The KVK developed the technology of application of 1 basket of FYM mixed with 1 kg neem cake enriched with 50 gm *Trichoderma*, to the vine and covering with 1.25 m² polythene sheet tightly fitting around the collar of the vine. The technology has been found to be very effective in managing foot rot. Likewise, the practice of drying fresh berries on cow dung plastered floor or
bamboo mats was resulting in low quality yields and producing unhygienic berries leading to low market price. A low cost method was developed by KVK in which, the berries were processed between UV resistant polythene sheets for 1 - 1½ hrs by solarization, followed by sun drying. The method has been most widely accepted for the processing of black pepper as it produces high quality produce & fetches higher prices in the market.
Another innovation he stressed upon was manufacturing home generated fertilizer (HGF), prepared by soaking soil mixture (97 kg soil + 2kg rock phosphate + 1 kg charcoal powder) in cow urine till saturation in a pit. Afterwards, it was removed from pit and dried in shade. Optional addition of 10 kg neem cake with 90 kg HGF was recommended to enhance its bio-efficacy. The enriched HGF was found to contain N: 5-6 %, P: 0.3%, K: 1.75%, Ca: 0.29% and Mg: 0.18%. With the use of this fertilizer early flowering and higher yields have been reported. To thwart monkey he was using bags to cover the bunch of banana. KVK standardized the technology of mounting the octopus near the base of the banana bunch. The fabricated octopus was fixed on the base of the bunch and connected to the electric fence with the insulated wire. In the end, he told that there are many such innovations across the locations which every KVK should document and study their feasibility to solve localized problems.
**Entrepreneurship Development of Tribal Farmers through Quality Seed Production Programme:** Dr. Vijay Kumar Verma, KVK, Betul (Madhya Pradesh)

Dr. Vijay Kumar Verma, Programme Coordinator, KVK, Betul (Madhya Pradesh) in his presentation on “Entrepreneurship Development of Tribal Farmers through Quality Seed Production Programme” and deliberated on how the KVK intervened to transform the socio economic status of tribal farmers through quality seed production programme on maize. The programme was taken up in 16 villages through development of seed societies involving 200 farmers. The attention was paid to strategies for entrepreneurship development to enable the farmers to grow more crops per drop of water, secure more output from farm, multiple land uses, more productivity and profitability and livelihood security through quality seed production. The emphasis was laid on human resource development through human capital approach to enhance competency and role; socio-psychological approach for motivation, attitudes and value; and poverty alleviation approach for education, health, other measures and investments. The most important parameters were the appraisal interview to analyze viability, local aspects, capability, focused behavioral event interview (FBEI), existing entrepreneurs, potential entrepreneurs, soft skill and hard skill competencies, job competency assessment and competency models to assess the entrepreneurial competency.

Dr. Verma informed that the tribal population of the district was 43.01% and the average land holding was 0.4 - 1.0 ha. The major crops grown by the tribal farmers in the district during **kharif** were soybean, kodo-kutki, sorghum and maize. The technology selected for entrepreneurship development was seed production technology of maize. The seed production site was selected in Godadongri & Shahpur blocks of Betul district of Madhya Pradesh. Two seed societies in 16 villages with 200 farmers were selected for seed production technology programme on maize. The crop was sown in 2nd to 3rd week of June following recommended package using yellow composite variety JM 216. Seed processing was done with the help of seed grader installed under ATMA, Betul. The cost of cultivation was found to be Rs. 24600/ ha. The technology resulted in additional return of around Rs. 34000 per hectare and higher benefit cost ratio. The technology was therefore adopted across the region and has enhanced the profitability of the tribal farmers.

**Best Management Practices for Technology Integration:** Dr. N. C. Sahu, KVK, Dakshin Dinajpur (West Bengal)

Dr. N.C. Sahu, Programme Coordinator, KVK, Dakshin Dinajpur, in his presentation on “Best Management Practices for Technology Integration” explained technology integration of different components i.e. horticulture, fishery, animal husbandry for optimum utilization of available resources. Up-scaling of resource conservation technologies viz. SRI in rice, drum seeder in rice and zero-tillage technology in wheat...
and entrepreneurships like vermicomposting and bee keeping were also taken up. The characteristic feature of this zone is inundation caused by sudden heavy rains due to lack of proper drainage facilities. Apart from rice other major crops grown are jute, vegetables, potato, mustard, wheat, pulses, groundnut and sesame etc.

The detailed deliberations made by Dr. Sahu about the activities and achievements of the KVK in some of these Best Management Practices (BMPs) and related activities are as under:

**Integrated Farming System (IFS):** It is the integration of different technology components like horticulture (vegetables in the dykes and trellises, fishery (IMC and magur culture) and animal husbandry (duck, poultry, dairy and piggery) so that residue of one component is used as the supplementary nutrient source for other component for optimum utilization of available resources, realizing maximum profit and stable return. KVK developed different models of IFS depending upon landholdings and the annual income from different sized IFS units with recommended technology components was as follows:

<table>
<thead>
<tr>
<th>Size of IFS units (ha)</th>
<th>Average Annual Income (Rs./ha)</th>
<th>Technology Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.133</td>
<td>5.0 lakh</td>
<td>Duck + Fish (IMC + Air breathing) + vegetables</td>
</tr>
<tr>
<td>0.133 – 0.266</td>
<td>5.5 lakh</td>
<td>Duck + Fish (IMC) + Vegetables</td>
</tr>
<tr>
<td>&gt; 0.266</td>
<td>6.5 lakh</td>
<td>Duck + Poultry + Piggery + Fishery (IMC) + Vegetables</td>
</tr>
</tbody>
</table>

At present, a number of IFS units of different sizes have been developed by the farmers from which about 35.5 lakh rupees of additional income has been generated by the farmers in the district.
Intercropping in banana plantation: Banana is cultivated in about 25,000 ha area in the district. During the initial 5-6 months of planting of banana suckers, the land is kept fallow by the farmers. Through OFT, it has been established that French bean (Var. S-9) and garden pea (Var. Arkel) in the ratio of 1: 2 (banana: crop) can be profitably grown as intercrop during this period with B : C ratio of 1.57. Now this tested technology of OFT has been taken to FLD and farmers are adopting it. About 25 ha of newly developed banana plantation has been brought under intercropping.

Magur breeding and culture: Participatory magur (air breathing fish) breeding and magur culture has been one of the most significant achievements of the KVK. It is a very profitable enterprise but the major bottleneck of dissemination of magur culture is the non-availability of magur seed in time and in sufficient quantity. Breeding of magur in general and hatching in particular has been simplified and till now four farmers and rural youths have developed magur hatcheries, producing magur seeds and supplying to other farmers. Performance of magur breeding and production of fry by the KVK through the farmers was as follows:

<table>
<thead>
<tr>
<th>Hatchery owner</th>
<th>Year of Establishment</th>
<th>Initial fry production (no.)</th>
<th>Current fry production (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisu Tudu</td>
<td>2005-06</td>
<td>7200</td>
<td>90000</td>
</tr>
<tr>
<td>Ainul Haque</td>
<td>2006-07</td>
<td>35000</td>
<td>120000</td>
</tr>
<tr>
<td>Hare Krishna Biswas</td>
<td>2007-08</td>
<td>57000</td>
<td>230000</td>
</tr>
<tr>
<td>Swapan Bhowmik</td>
<td>2010-11</td>
<td>70000</td>
<td>110000</td>
</tr>
</tbody>
</table>

There has been a significant increase in magur culture farmers and year-wise supply of fry after the KVK intervention and the additional income generated by the farmers through magur culture during the last seven years in the district has been to the tune of Rs. 3.42 crores.
SRI technology in rice: Both SRI and drum seeder technologies were introduced in the district by the KVK during 2006-07. SRI is a water saving technology and drum seeder is a labour saving technology. Performance of SRI in comparison to the traditional practice of rice cultivation as observed by the KVK is as follows:

<table>
<thead>
<tr>
<th>Particular</th>
<th>Normal practice</th>
<th>SRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain yield (t/ha)</td>
<td>5.25</td>
<td>8.25</td>
</tr>
<tr>
<td>Straw yield (t/ha)</td>
<td>5.00</td>
<td>8.00</td>
</tr>
<tr>
<td>B : C ratio</td>
<td>1.12 : 1</td>
<td>2.25 : 1</td>
</tr>
</tbody>
</table>

A saving of about 1148 liters of water per kg of rice grain was recorded when it was cultivated through SRI and an additional 664 ton of paddy production was possible through SRI in the district during last five years which in monetary terms were about 63.2 lakh rupees.

Drum seeder technology in rice: With the adoption of this practice, there was a saving of about 52 labourers (about Rs. 9000.00) per ha in drum seeder technology of rice cultivation. Total coverage of drum seeder in the district at present is about 223 ha during the last six years. Performance of drum seeder in comparison to the traditional practice of rice cultivation as observed in the district was as follows:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Normal practice</th>
<th>Drum seeder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain yield (t/ha)</td>
<td>5.25</td>
<td>5.80</td>
</tr>
<tr>
<td>Straw yield (t/ha)</td>
<td>5.00</td>
<td>5.60</td>
</tr>
<tr>
<td>B : C ratio</td>
<td>1.12 : 1</td>
<td>1.70 : 1</td>
</tr>
</tbody>
</table>
Zero tillage technology in wheat: Zero tillage technology in wheat was introduced in the district during the year 2006-07 and now the district has maximum area in West Bengal. It is a resource conservation technology not only saving fossil fuel and irrigation water but also improve soil health and productivity. During the last six years the total coverage of ZT wheat was 1603 ha with an additional wheat production of 962 tonnes amounting Rs. 1.44 crores.
**Breed replacement of pig:** Ghoongroo is highly prolific native pig breed identified by the West Bengal University of Fisheries and Animal Sciences in the Dooars area of Jalpaiguri district of West Bengal. KVK undertook human resource development and frontline demonstration programmes among the scheduled tribe farming community of the district which was a big success. Till now, 99 units have been developed by the tribal farmers getting an additional income of about 14.25 lakh rupees. The comparative performance of ghongroo and indigenous pig breeds is as under:

<table>
<thead>
<tr>
<th>Pig breed</th>
<th>Avg. no. of piglet/ furrowing</th>
<th>Avg. annual growth rate (kg)</th>
<th>B: C ratio of small piggery (2+1) unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Descript Local</td>
<td>05-06</td>
<td>55-70</td>
<td>1.85</td>
</tr>
<tr>
<td>Ghungroo</td>
<td>12-14</td>
<td>110-120</td>
<td>3.45</td>
</tr>
</tbody>
</table>

**Vermi-composting:** It is a farmer friendly low cost technology through which quality of cow dung manure can be improved and garbage can be turned into gold. The KVK conducted 22 training courses on vermi-composting for the members of women SHGs and rural youths with financial assistance from District Rural Development Cell (DRDC). Now, about 230 SHGs with 3150 members and six rural youths are involved in vermi-compost production in the district with present annual production of about 750 tonnes of vermi-compost.

**Integrated Pest Management (IPM):** The KVK has identified management practices of IPM in paddy, which included screening of physiologically matured seeds, seed treatment, seed bed treatment, skip row transplanting and bird perches etc. KVK conducted massive FLD programmes on IPM in the district and now farmers across 30 villages are
using IPM in paddy. It has been found to promote the number of friendly insects and lessen the use of pesticide in the area.

**Entrepreneurship development through beekeeping and mushroom cultivation:** After training rural youths were encouraged to take up entrepreneurs like beekeeping and mushroom cultivation who are now earning about Rs. 1.5-2.5 lakh rupees. They have also started producing value added products like mushroom pickles which are becoming increasingly popular.
Entrepreneurship development in beekeeping

**Documentation of farmer’s innovation:** Dr. Sahu also highlighted two farmers’ innovations which are:

- Mr. Bakul Chandra Das of village Basanta, PO Trimohini has developed an improved rice chakki with the help of the KVK, exclusively for preparation of rice dust from wet rice for cake making. Earlier, it was being done using atta chakki where the quality of rice dust is destroyed due to heat generated during grinding in between stone chakkis. But the rice chakki developed by the farmer has solved this problem by replacing stone chakkis with MS bar fitted against two plates. He is now manufacturing this machine commercially for sale.

- S. K. Sirajul Islam Shah of village Vior, PO Vikahar, has developed a mini combined harvester using his power tiller costing around Rs. 2.0 lakhs. The machine has been found very effective and efficient in the region.

Dr. Sahu in the end informed the house about the seed production programme taken up by the KVK and the effective convergence/ liaison with various agencies in the district.
Integrated Agricultural Development through Application of Best Practices: Dr. A. K. Singh, KVK, Ranchi (Jharkhand)

Dr. AK Singh, Programme Coordinator, KVK, Ranchi (Jharkhand) in his presentation focused on skill development, bee keeping, gravitational irrigation system, animal husbandry including poultry and duckry and farmers participatory seed production. Conservation agriculture using zero tillage and varietal replacement, women empowerment through integrated activities including women SHGs and capacity building of Bharat Nirman volunteers were the other major activities. Special emphasis on convergence with ATMA and other developmental organizations was laid for effective working at district level. Some of the key activities highlighted by Dr. Singh are as under:

**Lac cultivation:** Training and demonstration on scientific lac cultivation was provided to 1160 beneficiaries and 2 kg brood lac was provided to each beneficiary for Kusmi lac cultivation on ber and kusum plants. Four kg of brood lac was collected from the beneficiaries for the brood lac bank which resulted in revival of lac cultivation through
brood lac bank and technological support. Impact of the intervention was remarkable as the number of lac cultivators who adopted the technology increased to 735. Cost benefit ratio before intervention was 1:3 which increased to 1:8 after intervention and an average increase in income amounting Rs. 40000 to 50000 per annum was recorded which also decreased migration of farmers by 80 percent.

**Best management practices in bee keeping:** KVK provided training on beekeeping, bee boxes and bee colonies to 1165 farmers to farmers and regular follow-up by scientist was taken up for 2-3 year. Farmers were encouraged to use five combs instead of 3 combs in a colony. The KVK also provided marketing facility at the centre to avoid distress sale of honey after testing and processing at KVK. Radhakant Giri, a progressive farmer who has received President Award, is a resource person (Jharkhand Govt, KGVK, KVK, NGO) and presently supplying honey to Dabur of worth rupees 5 to 7 lakhs per annum.

**Animal husbandry intervention:** Apart from trainings, KVK has established artificial insemination centre and veterinary First Aid services in the villages. The trained progressive farmers inseminate, treat and vaccine cattle in the villages which decreased mortality in cattle by 50 per cent.

**Gravitational irrigation system:** Gravitational irrigation system using water flows from top to bottom under the influence of force of gravity by making storage tanks at top and laying HDPE pipes to farms was used in about 525 acres of land for irrigation. The intervention has increased the cropping intensity in the area from 114% to 250% with adoption of high value cash crops like vegetables. The productivity has also enhanced and resulting in improved socio economic status of the farmers.

**Resource centre for improved red birds (poultry and duckery):** The centre established a hatchery unit for providing chicks and ducklings to different agencies. With the introduction of improved breeds, an increase in rearing of these birds was recorded.
Quality seed dissemination: The KVK is also instrumental in disseminating quality foundation seed of different crops after procuring breeder seed from ICAR institutes and multiplication at KVK farm.

Conservation agriculture: Conservation agriculture promotes minimum disturbance of soil by zero or reduced tillage, balanced and crop need based application of chemical inputs, and skilful management of crop residues and wastes. The centre laid out demonstration on zero till wheat and paddy cultivation in the district.

Women empowerment through integrated activities: KVK established 364 groups out of which 248 were women SHGs. All the groups were involved in income generation activities viz., mushroom cultivation, goatery, poultry, nursery raising, vermi composting, lac cultivation, duckery, piggery, beekeeping, broom making, soap making, incense stick making, farming and business etc. thus improving their socio economic status and livelihood.
Capacity building of Bharat Nirman volunteers: Bharat Nirman volunteers are a village level cadre for accelerating the implementation of govenment projects, schemes and programmes. There were many gaps which were affecting the delivery of benefits to intended beneficiaries in different poverty alleviation programmes like MNREGA, IAY, SGSY, PMGSY, IWMP, RKVY, NFSM, NHM etc. The KVK identified and selected volunteers (1 volunteer for 10 to 20 families) from the village to look after, coordinated the projects being implemented for assisting in social audit and to remain vigilant. At present, the volunteers are assisting in conducting social audits of MNREGA at panchayat level. They are helping farmers in getting KCC cards and actively participate in planning and implementation of IWMP project. They are also motivating the farmers to actively participate in various programmes of state government.

Water Harvesting for Multiple Uses: Dr. Shabir Hussain Wani, KVK, Senapati (Manipur)

Dr Shabir Hussain, Programme Coordinator KVK Senapati emphasized on different approaches/ techniques being used for rainwater harvesting suitable for hill agriculture. He told that per capita and per hectare availability of water in this region is the highest in the country. However, less than 5 percent of the existing potential of the region has so far been tapped for societal use. As against an ultimate irrigation potential of about 4.26 million hectares, the area presently under irrigation is only 0.85 million hectares. The total water discharge from the two river basins viz. the Barak River basin and Manipur River Basin has been estimated to be 1.8545 M hectare meters and the total availability of water is 1.8487 M hectare meter against the requirement of 1.1121 M hectare meter. The water balance thus works out to be 0.7366 M hectare meter in the annual budget. The region receives the highest annual rainfall (2300cm) as compared to national average of 150-200 cm, there is indeed a huge scope for rain water harvesting especially surface run-off and roof top rain water. Some of the salient activities highlighted by Dr. Hussain are enlisted below:

- In view of the severity of water crisis especially in rabi season, KVK Senapati made efforts to develop a model for water harvesting for multiple use under hill agriculture. A water harvesting structure has been established at its campus in which the excess rainwater during the rainy season gets collected in the pond and this water is utilized during the winter (water scarce months) for multiple uses like vegetable cultivation, livestock production including poultry and duckery.
- To tap the excess rainwater during rainy months, KVK established Sun Tracker Solar Micro Irrigation System to demonstrate the technology to farmers of Senapati district which was inaugurated by Dr. K. D. Kokate, DDG (AE), ICAR, New Delhi on 12th May, 2012. The micro irrigation system has also been installed in the
KVK farm for irrigating the demonstration plots of horticultural and agronomic crops like, potato, kiwifruit, cabbage, pulse and other cereal crops.

- Rain water harvesting structure was established in the year 2007 under the financial support of ICAR and serves as a demonstration model for trainees and other officials. The harvested water is generally utilized for irrigation in the demonstration plot and for other uses during the winter dry period. The water is also being used by the nearby villages for domestic purpose.

- In addition to the different models for efficient utilization of rainwater at the campus, many progressive farmers have been given training for water harvesting and its multiple uses. A progressive farmer Alex, resident of T. Khullen village has established a water harvesting structure (pond) at his farm with a storage capacity of 80000 liters of water. He has planted kiwifruit on two hectare farm area and also grows various seasonal vegetables, turmeric, tree bean, bamboo, and also rear poultry, fishery and goat in his farm. The water stored in the pond is used especially during the dry winter period. The farmer has enhanced his activities and income after adopting this model.
Dr. Kameswar Das, Programme Coordinator emphasized upon KVK’s role in crop diversification in silt deposited areas of Assam in Nalbari and Barpeta districts of Assam. He gave detailed presentation about the geographic location and problems being faced in the district, especially flood in various rivers in the state. He stated that due to deforestation in the upstream and downstream areas of surrounding hill states, the river waters collect a tremendous amount of silt and other debris and raise the level of the river beds making it impossible for the main channel to cope with the vast volume of water received during the rains. As a result, in each flood season, the Brahmaputra and its tributaries forsake their earlier channels to cut new swathes through the soil. As the water recedes, alluvial deposits remain in the river, giving rise to sandy islands. Some of these islands are very large, and the annually enriched soil has attracted cultivation and semi-permanent settlement. Besides flood, the highly productive and fertile soils of Assam are now facing the serious problem of soil erosion, sand casting, landslides and cyclonic storms like other parts of the country. Under heavy precipitation and humid climate loss of topsoil through surface run-off is the most common type of soil erosion in the entire state. The problem
of topsoil erosion is severe in the plain during the flood season. It is estimated that nearly 3.2 million hectares of land of the plain districts of the state are vulnerable to topsoil erosion with varying intensity. Terrain deformation through mass movement is another type of soil degradation, which is primarily confined to the hill districts of Karbi Anglong and N.C. Hills covering an area of about 1.53 million hectares.

In Assam, farmers traditionally use Char areas (silt deposited areas) of the state for raising nurseries of summer paddy besides cultivation of mustard, black gram and vegetables etc. Though, Char Agriculture (cultivation in silt deposited beds/areas) has been proven as competitive intervention measure to utilize silt deposited areas in different parts of country to earn the livelihood as well as sustain the soil health, but needs validation in this part. KVKs of the state have already started initiatives by organizing various training programmes and awareness campaign as well as demonstrations on different competitive agricultural technologies in the char areas on crops like watermelon, bitter gourd, cucumber, summer black gram, garlic and pumpkin etc. A brief detail of different crop demonstrations in Char areas conducted by various KVKs of Assam is as under:

<table>
<thead>
<tr>
<th>District</th>
<th>River bank</th>
<th>Demonstrated crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chirang and Bongaigaon</td>
<td>Aie river, Champa and Manas river</td>
<td>Watermelon, Pumpkin, Bitter gourd, Cucumber</td>
</tr>
<tr>
<td>Dhemaji</td>
<td>Kumatia, Jiadhal, Moridhal, Gairiver</td>
<td>Garlic, Pumpkin, Watermelon</td>
</tr>
<tr>
<td>Dhubri</td>
<td>Brahmaputra, Champa</td>
<td>Watermelon, Bitter gourd, Cucumber</td>
</tr>
<tr>
<td>Lakimpur</td>
<td>Subansiri, Ranganadi and Dikrang</td>
<td>Summer black gram, Garlic and Pumpkin</td>
</tr>
</tbody>
</table>

Dr. Das stressed upon that exploiting the vast resource bases along with right policy support and successful dissemination of the relevant information and technologies to the farming community of sand/silt affected areas, so that sustainable agricultural development of the state can be ensured.

**Integration of Technologies for Disease Management in Horticultural Crops:**

Dr. S. K. Gupta, KVK, Solan (Himachal Pradesh)

Dr S.K. Gupta, Programme Coordinator in his presentation on “Integration of technologies for disease management in horticulture crops in Solan district emphasized upon different technologies such as host plant resistance (HPR), cultural practices, exclusion of inoculums, biological control, judicious use of chemicals and use of bio-pesticides. He told that during cultivation, horticultural crops are infected by several
fungal, bacterial and viral diseases which cause 25-28 per cent losses at pre/ post harvest stages besides impairing the quality of the produce. The management of diseases through elaborate chemical spray programme leads to pollution and health hazards, thus warrants integration of safer and eco-friendly technologies for their management which require knowledge of important aspects of disease development viz. cause(s) of the disease, mode of permeation and dissemination, host-parasite relationship, means of secondary spread, effect of environment on pathogenesis and spread of the disease etc. Some of the technologies stressed upon by the KVK included

- A combination of available levels of resistance and weather based minimal fungicide application for rehabilitation of cv. Kufri Jyoti of potato in late blight prone hilly areas of India. The most important cultural practices which reduced initial inoculums were crop rotation, soil amendments, compost, tillage, sanitation, soil solarization, flooding, fire and flaming, harrowing and mowing and rouging, while those reducing the infection rate were mulching, irrigation and water management, multiple cropping, grafting, sowing and spacing of crops, and mineral nutrition etc. The inoculums exclusion was achieved by seed treatment, inspection, certification and quarantine.

- In tomato the Buckeye Rot (*Phytophthora nicotianae* var. *parasitica*) is a burning problem in the district which causes 35-40% losses in crop yields. The incidence of the disease is prominently seen between or after six week after transplanting. In order to avoid the pre-disposition of fruit rot, it was advised to keep the plants erect by staking. At fruit initiation stage to avoid conditions favourable for inoculums multiplication and to ensure better protective cover of fungicide on lower fruits, the field was kept free from weeds and lower leaves up to the height of 15-20 cm were pruned out. Pine needle mulch was applied and infected fruits were collected and destroyed. The crop was sprayed with the combination of metalaxyl + mancozeb (0.25%) or cymoxanil + mancozeb (0.25%) ensuring coverage of the fruits helped in assured crop disease management. At 10-14 days interval, the crop was sprayed with copper oxychloride (0.3%) or mancozeb (0.25%) or Bordeaux mixture (4: 4: 50). The demonstration in farmer’s fields on disease management was focused on seed treatment with Captan (0.3%) + sprays of Ridomil Gold (0.25%) followed by two sprays of Blitox-50 (0.3%) or Dithane M-45 (0.25%) + staking + remove lower leaves up to 20cm + pine needle mulch in comparison with farmers practice (no seed treatment + indiscriminate use of fungicides). The results revealed 22.7 increase in yield with average net returns and the B: C ratio of Rs. 3.20 lakhs/ha and 2.06 compared to Rs. 2.05 lakhs/ha and 1.68 in farmers practice, respectively.

- To combat the problem of mosaic in bell pepper and tomato transmitted through an aphid, the management of mosaic was possible through integration of technologies viz. raising of nurseries in net house, early planting to avoid high
vector population, use of yellow coloured sticky taps to attract aphids, spray of neem oil @ 3-5 ml/liter water and use of safe insecticide at right doze and time and demonstrated successfully.

- For the management of damping-off in vegetables, ornamentals, and field crops the management technologies including soil solarization for 45 days clubbed with seed and soil treatment with *Trichoderma viride* was the best practice for the management of damping off which resulted in 9.3% pre emergence damping off, 6.0% post emergence damping off and 75.0% disease control.
- In order to mitigate angular leaf spot in French bean which accounts for 40 to 70 per cent losses, a short term forecasting method and early warning system has been developed based on daily temperature and percent relative humidity. A dry period
of 3 hours in between two wet periods (more than 80 per cent relative humidity) was also considered for calculating infection period. KVK also standardized and demonstrated management schedule for this disease using three sprays of difenoconazole @ 0.03% which resulted in 64 per cent reduction in severity, 162 q/ha yield and 2.24 B: C ratio, respectively.

- In horticultural crops especially peaches and cherry, crown gall (*Agrobacterium tumefaciens*) is causing annual losses of worth Rs. 10 million. Integrated disease management by soil solarization for 90 days and mixing of *Bacillus subtilis* (5 l/m² containing $10^8$ CFU per ml) in the nursery soil was validated / standardized and found highly effective.

Blending Technologies for Sustaining Natural Resources: Dr. A.S. Dahiya, KVK, Panipat (Haryana)

Dr. A.S. Dahiya, Programme Coordinator, KVK Panipat made a presentation on “Blending Technologies for Sustaining Natural Resources”. He emphasized on various technologies for sustaining natural resources viz. zero tillage in wheat, mushroom cultivation and productive use of crop residues, green manuring in rice-wheat cropping system, crop diversification with summer moong, direct seeded rice, laser land leveling, varietal diversity in rice promoting basmati rice, varietal diversity in wheat and residue management. The details of the activities undertaken by the KVK are as under:

**Zero tillage:** Saturation of zero till sowing of wheat in village Bauhapar of district Panipat was made possible by the efforts of KVK. In the adopted village, the area under zero tillage increased from meager 4 ha in 1998-99 to around 436 ha in 2008-09 covering around 95.2 per cent of total wheat area. There are 22 drills and each drill covering
around 20 ha area. Before the introduction of zero tillage, wheat productivity was stagnating around 3.5 t/ha. There is definite yield gain in successive years and farmers now targeting yield around 5.0 t/ha. In the district, the area under zero till wheat cultivation in the year 2000-01 was less than 1000 ha which has increased to more than 6000 ha in 2011-12.

**Mushroom production**: The KVK laid out demonstrations on the replacement/substitution/combination of paddy straw with wheat straw to ensure supply of raw material, finding out alternate option to wheat straw enhancing productivity and cutting down costs. The net additional returns with use of paddy straw alone and paddy and wheat straws (50:50) were Rs. 27289/- and Rs. 29505/- per 100 quintals of straw with B:C ratios of 2.28 and 2.17, respectively. It resulted in a fairly good impact with 20-50% replacement in between the period 2007 to 2010 and contributed about Rs. 2.0 crores in the farmer’s economy. Mushroom cultivation is an eco-friendly technology countering rice straw burning and used spent compost is used as good quality manure.
KVK also promoted mechanization in mushroom cultivation. Two machines viz., compost turning machine and hole making machine were demonstrated which apart from saving labour costs and time also improved quality. The adoption of these technologies resulted in increase in mushroom units in the district and mushroom production in the district has gone up from 100 tons in 1995-96 to 1700 tons in 2011. About 20-50 % shift from wheat straw to paddy straw as composting material has been recorded in the district.

Green manuring: For soil health sustenance, incorporation of cover crops into the soil was demonstrated which improved the nutrient status, soil structure and microbial activity in the soil. Green manure crops proved useful for weed control, erosion prevention, and reduction of insect pests and diseases. KVK is ensuring timely availability of seed of improved variety (DH 1) of *Sesbania*, and the farmers are now growing this crop in paddy-wheat cropping system.

Crop diversification: Crop diversification primarily involves a substitution of one crop or other agricultural product for another or an increase in the number of enterprises, or activities, carried out by a particular farm. KVK introduced improved varieties of summer moong and raya which increased B: C ratio from 3.14 with paddy (Pusa Basmati 1121) with green manuring (*Sesbania*) – wheat (PBW 502) system to 3.23 with paddy (Pusa Basmati 1121) with summer moong as preceding crop – wheat (PBW 502) cropping system.

Direct seeded rice: Dr. Dahiya raised doubts about direct seeded rice in the district as the yield of direct seeded rice was not satisfactory due to weak root system, nutritional and water stress during reproductive phase.

Laser land leveling: Regarding laser leveling technology Dr. Dahiya informed that at present, there...
are 32 laser levelers and the farmers are fully convinced with the technology. KVK has been successful in adoption of laser land leveling with 90 per cent coverage in two adopted villages (Bhaupur & Dehra).

**Varietal diversity in rice & promoting basmati rice:** After KVK’s efforts, the area under old Basmati, superfine varieties, susceptible varieties like PB 1 and private sector hybrids decreased, while area under Pusa Basmati 1121 and CSR 30 has increased. KVK has also resolved the problem of straw burning and countered the tendency of early transplanting.

**Varietal diversity in wheat:** PBW 343 remained the leading variety for more than one decade but now has been replaced with DBW 17, PBW 550, HD 2851, HD 2967 and DPW 621-50. Dr. Dahiya informed that DBW 17 is leading variety of wheat, but is susceptible to yellow rust, while seed availability of yellow rust resistant HD 2967 and DPW 621-50 has been a constraint. He told that PBW 550 is the best alternative, where sowing is generally done around 15th November and HD 2851 is the best option where sowing is done after 25th November (5-8% area).

**Crop Diversification, Varietal Replacement in Gram and Nutrient Management in Rice:** Dr. (Mrs.) Dhanalakshmi, PC, KVK, Kurnool (Andhra Pradesh)

Dr. (Mrs.) Dhanalakshmi, Programme Coordinator, KVK, Kurnool (Andhra Pradesh) briefed the audience about the district, agro climatic zones, soil types, farming situations and crops grown in the district and laid stress on crop diversification, varietal replacement in gram and nutrient management in rice and convergence with other developmental departments and NABARD.

**Crop diversification:** In the district, jowar and rainfed cotton are main crops in kharif season. But due to late onset of monsoon, there was a problem of delayed sowing. Also due to prolonged dry spells of 20 days duration and terminal moisture stress, there was a negative effect on crop growth. In order to mitigate this situation, Setaria (variety SIA-3085) as an alternate crop was introduced by the KVK. The duration of the crop is only 75-85 days. It is tolerant to drought and downy mildew and suitable for delayed sowing. It can be cultivated throughout the year and has a yield potential of 2800-3000 kg/ha. The variety was popularized through frontline demonstrations followed by field visits, field days and mass media coverage by KVK. With the intervention of KVK, the cultivated area under Setaria increased by 91.37% from 8084 ha in 2009 to 15471 ha in 2012.

In the western part of the district, rainfed sunflower and bengalgram are main crops. In order to mitigate the effect of dry spells and wild animal damage, Ashwagandha (*Withania somnifera*) variety Poshita, as an alternate crop was introduced by the KVK. The crop is tolerant to drought, requires no fertilizer application and has a yield potential of 650-750 kg/ha (dried roots). No incidence of pests and diseases has been reported on
this crop. The variety Poshita was upscaled through frontline demonstrations, field visits and field days and mass media coverage by KVK in collaboration with AP Medicinal aromatic plants board. With the intervention of KVK, the cultivated area under Ashwagandha increased from 327.5 ha in 2009 to 471.5 ha in 2012. The B: C ratio with cultivation of this crop was also higher.

In other parts, seed production of hybrid castor (PCH 111 and PCH 222) as an alternate crop to groundnut was upscaled through collaborative efforts of KVK and ANGRAU.

**Varietal replacement:** Bengalgram is a major *rabi* crop in Kurnool district. It is grown in an area of approximately 210983 ha. The earlier sown varieties viz., Annegiri, Gulabi were not performing well due to low yield potential (17-20q/ha), susceptibility to wilt, small grain size, lesser market price, non suitability for mechanical harvesting etc. To mitigate these problems, KVK took up the challenge to introduce JG-11 variety which is tolerant to wilt, bold seeded desi variety with top branching characteristics, suitable for
mechanical harvesting and having a yield potential of 20–25q/ha. KVKS efforts resulted in 92.7 per cent varietal replacement during last five years.

Likewise in paddy, BPT-5204 (kharif) and RNR-1446 (rabi) varieties owing to long duration (165 days), susceptibility to brown plant hopper and blast were replaced with medium duration (135 days) Nandyala Sannalu (NDLR-8) variety of rice which was suitable for both late kharif and rabi cultivation, tolerant to brown plant hopper and blast. The variety became so popular that it spread even in other districts of Andhra Pradesh and Karnataka state.

**Nutrient Management:** KVK promoted integrated nutrient management system on soil test based nutrient application through NABARD (project mode) for reducing the cost of production besides better soil health care and sustainable soil productivity. The soil test crop response equation for rice with a targeted yield of 75q/ha was FN=3.35T−0.33 SN: F P₂O₅=2.52T–4.53 SP: F K₂O =1.24T–0.12 SK. This resulted in higher returns and lowered the input cost, consequently, adopted by a large number of farmers in the district.

**Impact of Soil Test Crop Response in Rice over the years**

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of farmers adopted</th>
<th>Adoption in ha</th>
<th>Saving on fertilizers cost (Rs in lakhs)</th>
<th>Additional income for adopted farmers (Rs in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>16</td>
<td>12</td>
<td>0.70</td>
<td>1.24</td>
</tr>
<tr>
<td>2007</td>
<td>26</td>
<td>42</td>
<td>2.52</td>
<td>4.35</td>
</tr>
<tr>
<td>2008</td>
<td>144</td>
<td>178</td>
<td>10.68</td>
<td>18.33</td>
</tr>
<tr>
<td>2009</td>
<td>255</td>
<td>528</td>
<td>31.68</td>
<td>54.38</td>
</tr>
<tr>
<td>2010</td>
<td>396</td>
<td>955</td>
<td>57.30</td>
<td>98.37</td>
</tr>
<tr>
<td>2011</td>
<td>531</td>
<td>1205</td>
<td>70.95</td>
<td>118.68</td>
</tr>
<tr>
<td>Total</td>
<td>1368</td>
<td>2920</td>
<td>117.85</td>
<td>295.35</td>
</tr>
</tbody>
</table>
After the presentation by the KVK Programme Coordinators, the Chairman moderated the discussion on these presentations and complimented the good work being done by the KVKs and emphasized upon following the good technologies across the locations for harnessing the full potential of these technologies.

**Recommendations**

- Successful custom hiring and entrepreneurship development models and programs of NICRA project involving tribal and other resource poor farmers with focus on human capital, social psychological and poverty alleviation approaches may be documented and up-scaled in other villages.
- The climate resilient technologies like conservation agriculture, zero tillage, varietal replacement, direct seeded rice, woman specific technologies etc., demonstrated by KVKs under NICRA project need to be documented and shared with ATMA for large scale adoption.
• There is a score for large scale adoption of agro-technologies like DSR, suitable paddy cultivars cum fish culture, farm mechanization, ZT wheat, inter-cropping in sugarcane for increasing production of rice, wheat and sugarcane crops with higher returns per unit area in flood prone areas.

• Emphasis should be laid on intensive awareness for water conservation through use of mini sprinkler/ drip irrigation, use of mulching including plastic mulch, integrated water management approach through Public Private Community partnership.

• In rainfed areas, use of rain gun or sprinkler at critical stages such as flowering, peg formation and pod development and intercropping of groundnut + castor or cotton be followed for higher crop sustenance.

• For reduction in investments towards the purchase of external inputs, community based institutions/ user groups should be created for effective utilization of farm and home resources. Special emphasis be laid on livelihood security through group based approach, soil and water conservation through watershed approach, animal health promotion and welfare, commercial nursery promotion and scientific grain storage.

• KVKs should lay emphasis on Integrated Farming System models for small and marginal land holdings.

• Conservation agriculture using zero tillage and varietal replacement, women empowerment through integrated activities including women SHGs and capacity building of youth volunteers/youth groups should be followed across the locations.

• Replacement of wheat straw with paddy straw (20 to 50%) for mushroom cultivation and diversification of rice-wheat cropping system with summer moong should be up-scaled on large scale in northern states.
Best Practices and Technologies for Higher Production, Value Addition and Improved Livelihood

Chairman: Dr. S. Ayyappan, Secretary, DARE and DG, ICAR, New Delhi

Special presentation: Krishi Vigyan Kendra- India’s Institutional Innovation Inspiring the World in the 21st century by Dr. Peter E. Kenmore (FAO Representative in India)

Panelists:
- Dr. J.S. Sandhu, ADG (Seeds), ICAR, New Delhi
- Dr. N.P.S Sirohi, ADG (Agril. Engg.), ICAR, New Delhi
- Dr. U. Srivastava, ADG (Horticulture), ICAR, New Delhi
- Dr. Madan Mohan, ADG (Marine Fisheries), ICAR, New Delhi

Special Remarks: Shri Kuldeep Dhaliwal, Member, General Body of ICAR Society

Rapporteurs:
- Dr. P.N. Kalla, DEE, SKRAU, Bikaner
- Dr. S.S. Nanda, DEE, OUAT, Bhubaneswar

Presentations:

1. Improving Production and Productivity of Field Crops
   Dr. J.S. Sandhu, ADG (Seeds), ICAR, New Delhi.

2. Engineering Technologies for Higher Productivity
   Dr. N.P.S Sirohi, ADG (Agril. Engg.), ICAR, New Delhi.

3. Horticultural Technologies for Higher Production, Value addition and Improved Livelihood
   Dr. U. Srivastava, ADG (Horticulture), ICAR, New Delhi.

4. Best Practices and Technologies for Higher Production, Value Addition and Improved Livelihood in Fisheries & Aquaculture
   Dr. Madan Mohan, ADG (Marine Fisheries), ICAR, New Delhi.
A View of Technical Session
DR Peter E Kenmore, FAO representative in India in his presentation on “Krishi Vigyan Kendra- India’s Institutional Innovations Inspiring the World in the 21st Century” said that KVK in India is unique in its culture in the world as no other agricultural system, large or small, in the world, has decentralized frontline extension and adaptive research capacity at district level. KVKs are a model for adaptive research to diagnose and solve problems emerging from district agro-ecosystems and are perfectly located to lead and incubate local innovations. More importantly, KVKs are growing and are vital in the 21st century, as farmers face natural resource (water, land and biodiversity) constraints, climate change (drought, warming extremes) and increasing trans boundary risks from trade and traffic and market demands / price volatility. The most important problems are local as soils vary over tens of meters not kilometers, moisture and groundwater vary above and below ground, pests and diseases vary over days to weeks, not months; hence consideration at local diagnosis, local agro-ecosystems and local farmers are crucial for strategic planning and KVK is a best place to diagnose the farmers’ problems in the district, block, village and at farmers’ level. He suggested some of the Global Best Practices for adaptive research and stressed upon women farmer Field Schools for empowerment of women in his deliberations. He highlighted the Flooded Rice Food Web (Settle et al. 1996) for better understanding of various interactions taking place in rice ecosystem.

He also dwelt upon few success stories of Farmer Field Schools (FFS) and farmer scientist interactions.

KVKs are leading local innovations as these are best place to draw feedback from various institutes at district/ block/ village level and are
also most appropriate to diagnose field problems. KVKs should, hence, be empowered on methodologies for improved natural resources monitoring and global best practices for adaptive research. There is a need for fully real time linkage among KVK networks within states, across states and within agro ecological zones for full valued incentives for research in fields in the districts.

Thereafter, the panellists-cum- presenters made their presentations:

**Improving Production and Productivity of Field Crops: Dr. J.S. Sandhu, ADG (Seeds), ICAR**

Dr. J.S. Sandhu emphasized upon the need for improvement in production and productivity of field crops. He informed the house with regard to progress made by the country in production of various crops during XIth Plan, export of agricultural products, demand projections of different commodities until 2025, high yielding varieties/hybrids developed during last four years, production of breeder seed and improvement in seed replacement rates. He emphasized greater role of KVKs in meeting the targets of 2025. He highlighted that though the country has made progress in various sectors but the daunting task is to meet the demand projections for 2025 for which the NARS especially KVKs have to play a major role. He made a mention of salient achievements with respect to HYVs developed; breeder seed produced; status of seed produced; improvement in seed replacement rate of rice, wheat & maize varieties for specific traits for varied situations & major issues and technologies in the offing.
Sugarcane based intercropping for livelihood security: Short duration crops like green gram, lentil, etc. were found suitable for intercropping with spring planted cane and spring initiated ratoon. Planting of potato is suitable for intercropping in autumn sugarcane. These crops help in enhancing land-use efficiency in sugarcane based cropping systems and results in additional mid-season income.

In the end he mentioned about some approaches for enhancing the productivity of crops like:

- Identification of germplasm for specific trait/novel traits.
- Gene introgression from wild relatives (pre-breeding).
- Photo-thermo insensitive genotype development.
- Targetted integration of economically important genes for crop improvement-structural and functional genomics / molecular breeding in important crops.
- Improving the photosynthetic efficiency in important crop plants (C₃-C₄ switchover).
- Development of hybrids in rice, sunflower, pigeon pea, jute, castor, mustard and safflower.
- Bio prospecting of genes and allele mining for abiotic stress tolerance.
He also felt the need for strengthening of infrastructure especially establishment of seed quality testing laboratories, certification standards and diagnostic kits for transgenic/GM seed and establishment of grain quality testing facilities etc.

**Engineering Technologies for Higher Productivity and Profitability:** Dr. N.P.S. Sirohi, ADG (Agriculture Engineering), ICAR

Dr. Sirohi stressed upon the need for farm mechanization. He specifically indicated that agricultural mechanization results in 20-30 % saving of time; 15-20 % saving in seed/fertilizer; 20-30 % reduction in labour; 5-20 % increase in cropping intensity and 10-15 % higher productivity. It also results in reduction in drudgery of farm workers especially that of women workers and helps in conserving natural resources. Farm machinery for different operations like seed-bed preparation, seeding and planting, plant protection, interculture and weeding, harvesting & threshing are available which have to be adopted at farm level.

**Common types of greenhouses in use:**
- **Walk-in tunnels:** Basic type, low cost, easy to build, poor ventilation, limited use; construction cost - Rs. 100 to 150 per sq m.
- **Raised arch:** Higher version of walk-in type, improved ventilation, good for money; construction cost - Rs. 200 to 250 per sq m.
- **Saw-tooth, multi-span:** Much better ventilation and climate control, useful for large scale commercial production; construction cost - Rs. 500 to 1500 per sq m.
These designs are simple and can be self-constructed. The cost ranges between Rs. 250/- to Rs. 300/- per sq meter. With good crop schedule, the production system would be profitable. Saw-tooth, tubular structural designs with 4.0 m gutter height are popular for floriculture and vegetables production. Naturally-ventilated designs cost around Rs. 500/- per sq m. and with climate-control facility Rs. 1200/- per sq m.

He opined that crop production in greenhouses requires suitable varieties and management skills. However, value-addition through on-farm grading and packaging gets
higher profit. Round the year production of cucumber is possible in naturally ventilated greenhouse, which is a low-cost technology option.

**Greenhouse nursery in plug trays**: 40,000 seedlings can be grown per batch in 100 sq. meter area. Average duration of each batch is 30 days with minimum four batches/year. Total production is 1,60,000 seedlings per year.
Horticultural Technologies for Higher Production, Value Addition and Improved Livelihood: Dr. Umesh Srivastava, ADG (Horticulture), ICAR, New Delhi

Dr. Srivastava made a mention of technologies that transformed horticulture viz. plant architecture engineering and its management, reduction of production losses through efficient management of pests and diseases, post harvest management to reduce post harvest losses and on-farm processing, value addition and waste utilization etc. Based on the current issues, he suggested the following as way forward:

• Agriculture must diversify in favor of high-value enterprises. Marketing of products is more remunerative than sale of raw commodities, so farmer - processor linkages are needed to add value as per demands of the consumers.

• Agriculture is fast becoming demand driven from the earlier supply driven situation, so farmers will have to grow specific varieties needed for processing or add value to their produce.

• Policy and legislation should be reformed to allow processors to purchase their produce requirement directly from the farmers.

• Strategies may be chalked out to ensure end-to-end holistic approach towards post-harvest management, processing and marketing to assure returns to growers and also to assist retailers and whole-sellers in setting up facilities of pack house with cold chain facility, modified atmospheric packaging and controlled atmospheric storage of vegetables.

The major challenges for XII plan are to produce more for increasing population, declining land and water in the environment of climate change and conservation of natural resources. Thus, efforts are needed in this direction to capitalize on our strengths and remove constraints to meet the goal of moving towards horticulture led agricultural growth in India.
Best Practices and Technologies for Higher Production, Value Addition and Improved Livelihood in Fisheries & Aquaculture: Dr. Madan Mohan, ADG (Marine Fisheries), ICAR

Dr. Madan Mohan told the house that inland fisheries has grown fast during last few years as it accounts for 5.20 million tonnes out of total fish production of 8.42 million tonnes. West Bengal, Andhra Pradesh, Gujarat, Kerala, Maharashtra and Tamil Nadu are the major fish producing states in the country. During 2011-12, for the first time in the history of Marine product exports, the export earnings have crossed USD 3.5 billion. He informed that exports aggregated to 862021 tonnes valued at Rs. 16597.23 crores (USD 3508.45 million). Compared to the previous year, seafood exports recorded a growth of 6.02% in quantity, 28.65% in rupee and 22.81% growth in US$ earnings respectively. He mentioned that the technologies like portable FRP carp hatchery, manually operated low cost handy cryofreeze for gamete cryopreservation (CIFA-CRYO), brood stock diet (CIFABROOD) etc. played a vital role in success of fishery sector in India.

Dr. Mohan said that fisheries sector has water resources in plenty and finance is available for public and private sector from NABARD, NFDB, Banks & other Financial Institutions. He indicated that technologies for brood stock rearing, breeding, seed production and feed for different life stages of freshwater, marine, brackish water and coldwater fishes are available.

Recommendations

- The KVK has emerged as institutional innovation for carrying out adaptive research like technology assessment, refinement and its demonstration in farmer’s field. The KVK system should partner with global organization like FAO for mutual benefit and replicating KVK like institutions in other countries keeping in view their needs and requirements.
- The ICAR institutes and agricultural universities should ensure technology flow to KVKs to reduce the time lag in application of frontier technologies related to crop science; horticulture; farm machinery implements and agro-processing; livestock; fisheries; and aquaculture.
- Livestock- based advisory and diagnostic may also be given priority in KVK programs.
- The fisheries sector requires collective wisdom, implementable policies, clear vision for future, large investment in infrastructure, access to local & distant markets and safeguards against natural disasters for further holistic progress of fisheries.
Facilitating KVKs in Management, Administrative & Financial Matters

Chairman : Dr. S. Ayyappan, Secretary, DARE and DG, ICAR, New Delhi

Co-Chairman : Dr. K.D. Kokate, DDG (AE), ICAR, New Delhi

Panellists :
Shri A.C. Ghosh, Director (AE&GA), ICAR, New Delhi
Shri Naveen Jain, Comptroller, CCSHAU, Hisar
Dr. J.S. Urkurkar, DES, IGKV, Raipur
Swami Shashankananda Maharaj Ji, Secretary, R.K. Mission Ashrama, Ranchi
Dr. Y.P.S. Dabas, DEE, GBPUA&T, Pantnagar
Dr. T. Mohapatra, Director, CRRI, Cuttack
Er. V. P. Kothiyal, Director (Works), ICAR

Rapporteurs :
Dr. B.T. Rayudu, Senior Scientist, ZPD, Zone- VIII, Bangalore
Dr. Prem Chand, Scientist and I/C AF&AO, Zone-VII, Jabalpur
A View of Technical Session
Technical Session-4 on Facilitating KVKs in Management, Administrative & Financial Matters was held under the Chairmanship of Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR and Co-Chairmanship of Dr. K. D. Kokate, Deputy Director General (Agricultural Extension), ICAR on 21.11.2012.

At the outset, the chairman welcomed all the delegates and stated that the session was purely a business session for discussion on various issues and planning of important activities of KVKs to be taken up during XII Five Year Plan. Dr. Kokate emphasized the importance of this special session for seeking the critical inputs from the delegates of different cadres as well as different organizations in terms of management, administration, financial matters besides technical programme of KVKs. He further stressed that we need to resolve the issues at state, zonal and national levels for improving the KVK system. He added that the Directors of Extension of SAUs should be more pro-active for making the KVKs vibrant because they have to provide effective technological backstopping. He also highlighted some of the key recommendations of QRTs, which are approved by Governing Body of ICAR like timely flow of funds from Host Organizations to KVKs, delegation of administrative and financial powers to Programme Coordinators of KVKs and timely submission of Actual Expenditure Statement as well as Audited Utilization Certificate by the Host Organizations for further release of funds and effective implementation of technical programme.

Shri A.C. Ghosh flagged the following issues related to management, administrative and financial matters of KVKs:

- Utilization Certificate (UC) and Audited Utilization Certificate (AUC) should be submitted within one week after the completion of financial year and latest by December of the subsequent financial year, respectively.
- The release of further grant will only be possible when the actual expenditure up to September will be submitted and from November onwards, monthly actual expenditure have to be submitted.
- The AUC audited by Charted Accountant will not be accepted and must be audited by external audit.
- Vehicle replacement proposals may be submitted in the prescribed format after completing all the requisite formalities.
• Vacant posts in KVKs should be filled up as soon as possible by the host organizations.
• The Programme Coordinators should be empowered by decentralization of financial and administrative powers.
• Provision of reservation to physically challenged persons must be made irrespective of host organization as per rules.
• KVK should maintain asset, work and pay bill registers as well as cash books, both, main and subsidiary.
• There should be separate bank account for each KVK for effective cash flow and bank reconciliation statement should be made every month.
• Infrastructural facilities of KVKs like administrative buildings, farmers’ hostels, staff quarters etc. must be constructed on the demarcated site for the same.

Shri Naveen Jain, Comptroller, CCSHAU, Hisar shared the experience related to financial and administrative matter of KVKs which are as follows:

• The funds received from funding agency must be utilized after completing all codal formalities.
• The three important pillars of financial management viz. budget, account and audit must be taken care of while dealing with the financial matters.
• The budget estimates and revised budgets must be submitted in time as per requirement.
• The AUCs should be submitted in prescribed format and monthly expenditure statements should be submitted to the funding agency for financial monitoring.
• Generally, auditing is done at three levels namely pre, post and internal and the same may be adopted in KVK system for better financial management.

Thereafter, the Chairman called upon the suggestions of Vice Chancellors, Zonal Project Directors, Chairman of NGOs, Directors of Extensions, Programme Coordinators of KVKs and farmers.

Dr. R. R. Hanchinal, VC, UAS, Dharwad highlighted the following issues:

• Requirement of a separate farm women’s hostel in KVKs in view of increased participation of farm women.
• In view of good impact of NICRA, it may be extended to other KVKs.
• Number of SMSs may be increased in view of more workload at KVKs.
• Additional KVKs may be provided in larger and intensively populated districts for the benefit of the farming community.
• Rain water harvesting structures may be extended to more number of KVKs.

Dr. Narayan Gowda, Vice Chancellor, UAS, Bangalore endorsed the views of earlier speakers and pointed out that:

• KVKs of more than 20 year old may be strengthened with additional budgetary allocation.
• There is a need of two additional SMSs specialized in Agricultural Engineering and Marketing & Value Addition to address the concurrent issues.

Dr. B. S. Dhillon, Vice Chancellor, PAU, Ludhiana emphasized the renovation of staff quarters as well as construction of new staff quarters or payment of House Rent Allowances (HRA) for comfortable stay of KVK staff besides some technical issues like:

• Crop residue management may be taken up by the KVKs.
• New extension methodologies may be adopted for effective technology transfer.
• Timely release of grant for efficient functioning of KVKs.

Dr. A. K. Singh, Vice Chancellor, RVSKV, Gwalior said that capacity building and demonstration through ATMA may be encouraged through KVKs and online reporting system may be introduced for timely reporting to ICAR.

Dr. K. R. Dhiman, Vice Chancellor, Y S Parmar University of Horticulture & Forestry, Solan pointed out that the construction cost differs from region to region and, therefore, more funds for hilly states should be provided. As geographical location of districts varies from one terrain to other, different yardsticks may be followed for establishment of additional KVKs especially in hilly states like Himachal Pradesh. Motivation in terms of remote area allowances/ difficult area allowance may be paid to the KVK staff as per the existing rules to avoid the frequent transfers. In hilly states, Integrated Farming Systems may be promoted for the benefit of small/ marginal farmers by KVKs in the country.

Dr. V. K. Taneja, Vice Chancellor, GADVASU, Ludhiana stressed upon the need of livestock specialized KVKs. He pointed out that success and failure of technologies should be documented and identified problems in specific localities should be addressed with suitable technological interventions. Apart from this, EDP should be promoted in the KVKs and effective convergence may be developed between KVKs and line departments.

Dr. O.P. Gill, Vice Chancellor, MPUAT, Udaipur expressed that the vacant posts of KVKs should be filled-up on priority and more number of agricultural implements should be provided to each KVK.
Directors of Extension, SAUs

Some of the key issues highlighted by Directors, Extension Education of different universities are as under:

- Decentralization of financial and administrative powers to Programme Coordinators of KVKs, enhanced funds for training programmes and convergence with line departments may be followed without affecting the core functions of KVKs.
- Provision for TA/DA to the innovative farmers being used as resources person be made, capacity building of the innovative farmers be done at SAUs level, additional fund may be given for running village knowledge centers and strengthening of Directorates of Extension Education be done by providing vehicle and contractual staffs.
- Circulation of guidelines with respect to administration and financial matters of KVKs to all host organizations as well as KVKs.
- Discrepancies of grade pay of SMSs be resolved and gratuity be extended to KVK staffs irrespective of host organizations.
- Farm Innovators’ meets should be organized at least once in a year.
- KVKs may take up activities to cover more villages in convergence mode in the district at the extent possible instead of confining to selected blocks or villages.
- A baseline survey should be conducted and feedback mechanism may be developed by the KVKs to document not only success stories but also the failures with unearthing reasons.
- Funds flow should be in time and performance indicators may be identified for effective evaluation of KVK work.
- Convergence indicators may be formulated for effective linkages between KVK & ATMA, documentable extension methodologies may be followed by KVKs while carrying out activities and management information system may be developed for easy retrieval of data.
- Community based processing centers may be provided for KVKs for collective bargaining power.
- SMS in agricultural engineering may be provided to each KVKs in views of importance of farm mechanization in recent years.

Director, ATMA, Maharastra desired that capacity building of farmer’s group leaders and member of block level advisory committees may be taken up by KVKs and information accessibility may be strengthened in KVKs. He also mentioned that PC should be one of the members of the recruitment committee for selecting contractual staff for ATMA.
Facilitating KVKs in Management, Administrative & Financial Matters

Sh. Sudhir Bhargawa, Member, ICAR Governing Body said that budget allocation should be consolidated based on the critical review of the work done by the KVKs and benchmark survey should be conducted to compare the impact of KVKs. He further said that there are two bottlenecks viz. restricted mobility and running of critical activities, therefore, KVK should identify the technology adopted by majority of farmers and steps may be initiated for its further spread.

**Chairman and representative of NGOs**

S.K. Choudhary, Chairman, Educational Trust, Madhubani said that marketing is a critical issue and therefore, one SMS with post graduation in agri-business and marketing may be provided to KVK. He pointed out that though, a number of magazines are available on marketing but no such literature is available on agriculture marketing, hence journals may be initiated on agriculture marketing. He desired that more supporting staff may be provided to KVKs. At this juncture, the Chairman pointed out that the supporting staff may be outsourced as per the need.

Dr. K. Trivedi, Chairman, Kasturba Gandhi National Memorial Trust, Indore said that submission of monthly expenditure statements by the KVKs is good approach and it should be continued. He desired that guidelines may be carefully examined while selection of land/location for establishing the KVKs.

Shri. Anil G. Meher, Chairman, Gramonnati Mandal, Narayangaon, Pune desired that SMSs may be provided in the disciplines of agricultural engineering, processing and marketing to each KVK and tractor drawn equipments and implements may be provided for strengthening the farm mechanization. He further expressed that the Conference may be broadcast or webcast so that all the SMSs of KVKs can take the benefits of the same and PCs of all KVKs may brief about the Conference to the staff of their respective KVKs.

**Programme Coordinators of KVKs**

Some of the issues raised by the Programme Coordinators included uniform policy for regular appointment of SMSs across the country; frequent transfer of KVK staff; farm implements and machinery based on the suitability of region; provision of small scale processing units; preparation of national level technology repository may be prepared and circulation among KVKs for better utilization and up-scaling; provision of gratuity for KVK staff irrespective of the host organizations and pay scale parity of SMSs on par with the Assistant Professors of SAUs and scientists of ICAR; operational fund for on-going flagship programmes like seed production; creation of additional or satellite KVKs in larger districts; filling up of vacant posts and delaying of funds flow from the Universities which hampers the KVK activities; development of some KVKs as Centre of Excellence; organization of
specialized training programmes for the Home Science SMSs and capacity building of administrative and account staff.

The Chairman urged all the VCs, Directors of Research, DEEs, and other staff of universities to visit the KVKs frequently to acquaint with their work as well as constraints. QRT recommendations are approved by the GB and may be implemented properly.

**Assistant Director Generals (ADGs) and Zonal Project Directors (ZPDs) and Scientists**

Dr. V. Venkatasubramanian, ADG (AE) raised the issues of proper documentation of work done by the KVKs; attention of VCs and DEEs for effective functioning of KVKs; ownership of KVKs by host organizations and resolving of their problems; impact analysis by KVKs and ZPDs; updating technology inventories prepared by the SAUs; visibility of the KVKs by developing and updating websites and organization of Inter-Zonal workshops involving SMSs of KVKs for cross-learning.

Dr. A. M. Narula, ZPD Zone-I submitted his views and clearly defining the ATMA-KVK convergence; low progress in civil works; optimum utilization of infrastructural facilities; and vacancies as well as frequent transfer of KVK staff.

Dr. A.K. Singh, ZPD Zone-II mentioned that DEEs should play active role in KVK monitoring and for this purpose, DEEs may be strengthened by providing SRFs. He also requested to provide women farmers’ hostel to the selected KVKs.

Dr. A.K. Gogoi, ZPD Zone-III suggested the implementation of IFS models with the component of agro-forestry; provision of connectivity and mobility based on the geography of KVKs where they are located and conceiving the concept of satellite KVKs.

Dr. A.K. Singh, ZPD Zone-IV endorsed the earlier ZPDs suggestions and urged for timely release of fund from host organizations especially SAUs; maintenance of buildings and adequate powers to programme coordinators and DEEs for various civic or other works for effective working.

Dr. N. Sudhakar, ZPD Zone-V emphasized upon timely release of funds, especially for NICRA project from the respective SAUs. He also desired for provision of gratuity to KVK staff under NGOs and priority for development of infrastructure for new KVKs. He also requested for provision of additional fund for farm development.

Dr. Anupam Mishra, ZPD Zone-VII said that uniform service conditions should be there for KVK staff especially Programme Coordinators and filling of vacant post may be given priority. He also desired like many earlier speakers for provision of funds for renovation and maintenance of buildings, fencing etc.
Dr. S. Prabhu Kumar, ZPD Zone-VIII said that preparation of KVK guidelines are in progress under the Chairmanship of Dr. R.S. Paroda, former Secretary, DARE and DG, ICAR. He desired that criteria for Zonal KVK Awards may be relooked. It should not based on the documentation only and the ZPDs may be involved in short listing the KVKs. There is a need to re-look for establishing the additional KVKs in a district.

Sh. V.P. Kothyal, Director (works) said that master plan for construction work may be prepared in two copies and norm should not be exceeded while constructing administrative building. Plinth area may be extended for farmer’s hostel and it may be demarcated for farm women. CPWD rates are fixed and accordingly estimate may be prepared and submitted for all civil works as per approved rates of government. All civil works should be carried out based on the EFC only and also fund sanctioned need to be restricted as per the EFC approval. Use of local materials should be encouraged for civil works and he quoted KVK Jalna’s example. Use of non conventional energy like solar energy etc. sources may be encouraged.

Dr. T. Mohapatra, Director, CRRI, Cuttack said that success stories of KVKs need to be further up-scaled as well as circulated among other KVKs in the country. He said that less number of graduates in livestock is the matter of concern and need to be addressed on priority basis.

Dr. J.S. Urkurkar, DEE, IGKV, Raipur said that there should be uniform promotion policy for KVKs staff and Strategic Research and Extension Plan (SREP) should be incorporated in KVK annual action plans.

Dr. Y.P.S. Dabas, DEE, GBPUA&T, Pant Nagar said that Vice Chancellor should frequently visit KVKs, frequent transfer of KVK staff should be avoided and vacant posts should be filled-up on priority. He pointed out that there is insufficient technical staff in KVKs. Funds for civil works may be given priority and criteria may be re-looked for establishment of KVKs in larger districts.

Dr. K.D. Kokate, DDG (AE), appreciated the delegates for their active participation in discussions and providing good inputs for improvement of KVKs. He said that DEEs are the focal points for effective functioning of KVKs through technological backstopping. As KVK is a large network in the country, there are some constraints and therefore, the ICAR has constituted a High Powered Committee to formulate uniform guidelines for effective implementation of KVKs. He extended his gratitude to the Director General and all delegates for successful conduct of the session.

The Chairman said that more money more work is not the answer for KVK system. We had 360° perception in this session on KVKs functioning. Hence, we all should join hands for successful implementation of KVK scheme in mission mode.
Recommendations

- Timely flow of funds from host organizations to KVKs may be given priority.
- The Programme Coordinators of KVKs should be given/delegated administrative and financial powers equivalent to Heads of Departments/Divisions in AUs and ICAR Institutes.
- Timely submission of Actual Expenditure Statement as well as Audited Utilization Certificate by the host organizations for further release of funds and effective implementation of technical programme must be ensured by KVKs.
- Lacunae are being observed in the proposals of condemnation of KVK vehicles and these should be screened thoroughly by the host organizations to avoid delay in the process and therefore, it is suggested that condemnation of vehicles should be proposed based on the approved rules of ICAR (GFRs).
- Diversion of funds must be stopped i.e. the funds allocated for capital assets should not be used in revenue head and vice-versa. Re-appropriation of budget must be approved from the ICAR. The expenditure should not exceed the approved budget.
- Vacant posts in KVKs should be filled-up as soon as possible as per the latest qualifications and in consultation with Zonal Project Directors.
- The revolving fund provided to KVKs must be returned to ICAR within 05 years.
- Provision of reservation to physically challenged persons must be made irrespective of host organization as per rules.
- Custom hiring, IFS, rain water harvesting structures may be extended to more number of KVKs.
- Motivation in terms of remote area allowance/difficult area allowance may be paid to the KVK staff as per the existing rules to avoid the frequent transfers.
- Refreshment charges for trainings need to be enhanced as per provisions equal to other schemes of Government of India.
- Convergence with line departments may be followed without affecting the core functions of KVKs.
- Provision of TA/DA may be made for innovative farmers and Farm Innovators’ Meets should be organized at least once in a year.
- The pay scale of the SMSs should be at par with Assistant Professors of SAUs and Scientists of ICAR Institute and gratuity may be extended to KVK staff irrespective of host organizations.
- Guidelines with respect to administration and financial matters of KVKs may be circulated to all host organizations as well as KVKs.
• Availability of seeds of newly released varieties and hybrids is a constraint for KVKs, the DEEs and ZPDs should ensure the availability of seeds of newly released varieties and hybrids to KVKs.

• National level repository of technologies and best practices may be prepared and circulated among KVKs for better utilization and up-scaling.

• Some of the KVKs may be provided additional funds and developed as Centre of Excellence or specialized KVKs during XII plan.

• There is a need for regular capacity building of ‘administrative and accounts’ staff of KVKs and ZPDs on office procedures and financial management.

• Vice-Chancellors of AUs should be in constant touch with the DEEs for effective functioning of KVKs. A quarterly review meeting of all KVKs should be held under the chairmanship of VCs to review the functioning of KVKs.

• DEEs should play active role in KVK monitoring and technological inventory prepared by SAUs need to be updated regularly.

• Criteria for Zonal KVK Awards may be re-looked as it is not only based on the documentation, hence ZPDs may be involved in short listing of the KVKs.

• Proper documentation of work done by the KVKs and its impact assessment may be given utmost priority.
TECHNICAL SESSION – 5

Farm Innovations and Best Practices Developed by Farmers

Chairman : Dr. V.K. Taneja, Vice Chancellor, GADVASU, Ludhiana

Panelists : Dr. R.R. Hanchinal, Vice Chancellor, UAS, Dharwad
            : Dr. K.R. Dhiman, Vice Chancellor, YSPUH&F, Solan
            : Dr. O.P. Gill, Vice Chancellor, MPUA&T, Udaipur

Rapporteurs : Dr. K. Dattatri, Principal Scientist, ZPD, Zone-V, Hyderabad
              : Dr. P. P. Pal, Senior Scientist, ZPD, Zone-II, Kolkatta

Presentations:

1. Water Chestnut based Farming System Model for Higher Income through Processing and Value Addition
   Shri Vilas Tijare, Seoni (Madhya Pradesh)

2. Technology Integration in Dairying - Managing from Farm to Fork
   Shri Kishore Tulasiram Kate, Baramati, Pune (Maharashtra)

3. Protected Cultivation of Fruits and Vegetables in Hills
   Shri Tara Dutt Karakwal, Champawat (Uttarakhand)

4. Diversifying Farm Enterprises for Sustainable Small Farm Households
   Shri Dev Narain Patel, Lucknow (Uttar Pradesh)

5. Innovative Vegetable Seed Production
   Shri Jagtar Singh Brar, Bathinda (Punjab)

6. Innovative Diversified Farming
   Shri Kushal Pal Sirohi, Kaithal (Haryana)

7. Diversified Farming System with Horticulture Crops
   Major Manmohan Singh, Amritsar (Punjab)

8. Innovative Ways of Developing Livelihood of Tribal Farmers and Farmwomen
   Smt. Jaya Devi, Munger (Bihar)

9. Motivating Farmers for Taking up Community Farming for Economic and Overall Livelihood Development
   Shri Nawal Kishor Nath Sahadev, Lohardaga (Jharkhand)
10. Tractor Drawn Compressor Spray Pump  
Shri Nayan Pal Shivran, Jaipur (Rajasthan)

11. Modified Puddler and Leveller  
Shri Piyusbhai Ambalal Patel, Kheda (Gujarat)

12. Tricycle Weeder – An Innovation  
Shri Nagalingappa Manappa Badiger, Dharwad (Karnataka)

13. Identification of Medicinal Value and Processing of Indian Trumpet Flower  
(*Oroxylum indicum*)  
Mrs. Rose Mary Rymmai, Ri-bhoi (Meghalaya)

14. Water Harvesting & Women Empowerment in Nicra Village  
Shri Sant Kumar Sinha, Jehanabad, Bihar

15. Wheat Variety Baba Vishwanatha of BHU  
Shri Chandrashekar Singh, Varanasi, U.P.
TECHNICAL Session-5 on Farm Innovations and Best Management Practices Developed by Farmers was chaired by Dr. V.K. Taneja, Vice-Chancellor, GADVASU, Ludhiana. The panelists were Dr. R.R. Hanchinal, Vice-Chancellor, UAS, Dharwad; Dr. K.R. Dhiman, Vice-Chancellor YSPUH&F, Solan; and Dr. O.P. Gill, Vice-Chancellor, MPUA&T, Udaipur. The rapporteurs were Dr. K. Dattatri, Principal Scientist, ZPD-V, Hyderbad and Dr. P.P. Pal, Sr. Scientist, ZPD-II, Kolkata. Altogether, 15 farmers/farm women presented their innovative practices in this session.

Farmers are the backbone of Indian agriculture. The knowledge acquired and accumulated by the farmers through their continuous efforts to harness the best has been the foundation of agricultural development over the years and are being seen as the key partners for the sustainable agricultural development. Effective planning is, however, needed to ensure that the innovative knowledge of farmers is fully utilized for the benefit of farming community in the country. Linkages among various stakeholders along with the farm innovators are essential for the promotion and exchange of knowledge for making the meaningful impact of technologies among the rural masses. Farmers in the rural India are practicing many innovative technologies, which need to be recognized and documented. These grass root level farm innovators need to be provided appropriate opportunities and platform for wider sharing of their innovative experiences. The research institutions must also redirect their priorities to work and support local development initiatives and protect farmers’ knowledge for sustainable development.

Considering the importance of these local innovations of the farming community, a special session to highlight some of the farm innovations by the farmers themselves was kept in the technical programme of the Conference.

After brief introductory remarks about highlighting the importance of innovative practices developed and practiced by the farmers, the presentation by selected farm innovators across the country was held.

Water Chestnut based Farming System Model for Higher Income through Processing and Value Addition: Shri Vilas Tijare of Seoni, Madhya Pradesh

Water chestnut (Trapa natans) is one of the most important minor fruit crop grown in India. It is an aquatic nut crop grown mainly in the tropical and subtropical region as submerged plant community. It also thrives in the soft nutrient rich waters in lakes, ponds and streams with a neutral to slightly alkaline pH. The plant is well adapted to life at the water’s edge and prospers even when stranded along muddy shores. Water chestnuts are known to possess a remarkable nutritional composition, which makes them an excellent food source that can be a dietary staple. For this reason, they are set apart from all the
other nuts. The best part is that they are free of any cholesterol and are almost fat-free. They are also gluten-free. They have a white and crispy flesh and small, rounded corms that can also be eaten raw.

It is most commonly used as edible nut. The kernel of water chestnut contains a large amount of protein (up to 20%), starch (52%), tannins (9.4%), fat (up to 1%), sugar (3%), minerals, etc. It is also a good source of fibre and vitamin B along with Ca, K, Fe and Zn. Apart from these it has numerous curative and supplementing properties also. So, they are commonly known as cooling food and are excellent to beat heat of summer season. Moreover, mixture of water chestnut powder with water is used as a great reliever of cough. If you experience pain during urination, then drinking a cup of sweet soup of water chestnut can relieve you in a big way. It is also used to cure jaundice too in a great way and has detoxifying properties also. Dried and ground water chestnut (flour) can be used to make chapatis, as they are good source of energy. But, one should remember that it is low in protective antioxidants. They are extremely cold and laxative in nature and should not be eaten in excess otherwise, it can lead to gas trouble in stomach and bloating.

Shri Vilas Tijare also highlighted various advantages of water-chestnut cultivation like enhanced profit of Rs.30000-32,000/- per acre, in-situ amendment through incorporation of green manure followed by higher productivity of crops and vegetables. He opined that Integrated Farming System adopted by him under the guidance of KVK, Seoni which has brought prosperity in his economic status. Through value addition of water chestnut in the form of ‘Sauce’ and ‘Atta’, he further enhanced his earning. He is taking chestnut cultivation in waterlogged and marshy areas and has standardized input (equipment/plant and machinery / raw material / land / investment/man power / power needed), planting materials, fertilizers and necessary agro-inputs. The cost of cultivation is around Rs. 9000 per acre. So far, more than 100 farmers have adopted the technology under his guidance.
Technology Integration in Dairying- Management from Farm to Fork: Sh. Kishore Tulasiram Kate of Baramati, Pune district of Maharashtra

The farmer highlighted the dairy management process, especially value addition for better livelihood. He is having a small dairy unit from which the earnings were meager through sale of milk. After initial trainings, he thought of value addition of milk and focused on Ice-cream making. He generated information and got trainings from various agencies including KVK and started ice cream making venture about five years back. Initially, there were some problems but he got rid of all the hurdles and started getting a profit of around Rs. 75,000/- per annum. Thereafter, he opened two sale counters for faster sale of his products and also involved other farmers in the venture. Shifting to this enterprise from traditional agricultural practices, provided him economic stability. He is now in the process of making a farmer group involving all the dairy farmers to join hands with him in this venture for better profitability and better livelihood.
Protected Cultivation of Fruits and Vegetables in Hills: Shri Tara Dutt Karakwal, Champawat, Uttarakhand

Shri Tara Dutt Karakwal is recipient of a number of awards for innovations in agriculture. Roof water harvesting, terrace cultivation of vegetables, raising nursery in poly tunnel, portrays techniques of vegetables seedlings raising, mulching, tomato cultivation in the walls of dwelling houses, vermi composting and cultivation of onion and pea were the major areas of his farming. He could earn a net profit Rs.1.5 lakh per year.

Innovative Vegetables Seed Production: Shri Jagtar Singh Brar, Bathinda, Punjab

Shri Jagtar Singh Brar gave brief account of best practices being followed in his farm like judicious use of water, agro chemicals and fertilizers, safety of farm workers, implementation of global gap standards, waste management and proper record of
agricultural operation/ traceability etc. Owing to great potential of potato seed with in the country and abroad, he has taken virus free potato seed production as a major agri entrepreneur in his farm. He has been growing potatoes since 1977 and is engaged in seed production of potato varieties Kufri Bahar, Kufri Suriya and Kufri Sindhuri and garlic varieties G-282, G-50, G-323 on contract basis in collaboration with National Horticultural Research and Development Foundation (NHRDF) for the last few years. He has been practicing environment friendly operations, waste management and other standard practices. With the changing climate, problems highlighted by him in seed production included potato russetting and incidence of ground frost which were solved through bed plantation, micro irrigation, disturbing stolen to get increased number of tuber size potatoes, identification of potato russetting resistant varieties, north-south sowing of potatoes, use of bio wind breakers and sowing of potatoes based on weather forecasting etc., for quality production of potato seeds. He was advised to change variety for potato seed production by the panelists.

The farmer also emphasized upon some post harvest management tips like controlling the problem of farm heat of potatoes, keeping the potato ware in gunny bags for whole night in field during hot days, harvesting potatoes in the evening hours and picking early in the morning to increase the keeping quality of the potatoes and shifting potato seed in early hours to cold store. He also highlighted some problems of potato seed growers and their expectations from scientists.

Innovative Diversified Farming: Shri Kushal Pal Sirohi, Kaithal, Haryana

Shri K.P. Sirohi came in contact with KVK Kaithal in the year 2002. Till then he had been cultivating traditional crops of wheat, rice and sugarcane in conventional manner. Thereafter, he started cultivation of these crops on scientific basis. The results in terms of yield were found encouraging. He attended training programmes on bee keeping, mushroom cultivation and vermi-compost and became member of the Progressive Farmers Club, Kaithal. He started diversification process at his farm under the guidance of KVK experts and established several enterprises at his farm viz. fish farming, vermi-culture, biogas, mushroom, bee keeping, plantation of rose, papaya, aonla, ber, guava, lemon grass, pama rose, jama rose and citronella etc. He also planted poplar and eucalyptus plants on the boundary of his farm.

In addition, new technologies like drip irrigation, green house techniques for nursery raising with micro-nutrients, solar tube-wells, rose distillation plant, implement repair workshop, and service station are successfully run by him. In field crops, he diversified his farm with soybean, arhar, cowpea, horse gram, til, rajmah, gram, raya, berseem etc. Organic farming of desi wheat variety C-306 and basmati HBC-19 has also been undertaken on buy back arrangement with private firms.
Integrating Technologies and Best Practices

Diversified Farming Systems with Horticultural Crops: Major Manmohan Singh, Amristar, Punjab

Major Manmohan Singh, an innovative farmer of district Amritsar of Punjab, is growing fruit crops like Kinnow, Pear, Peach, Plum, Litchi, Banana, Turmeric, Papaya etc. He has been bestowed with Chief Minister Award by PAU, Ludhiana in Horticulture in the year 2009-10. Apart from fruit crops, he is cultivating sugarcane and turmeric with sizeable returns.

Value addition in Kinnow with grading, waxing and packing fetched him additional income also. He developed sugarcane nursery to bring more areas under this crop.
He has successfully grown Kinnow in heavy soils of Amritsar, though it is recommended only in light soils. He has installed drip irrigation in orchards and grading, waxing and packing unit at his farm. He has also set up a vermicompost unit at his farm and using vermicompost in the orchards. He is also growing turmeric under poplar plantations and has installed processing plant of turmeric.

He has been given due recognition at state as well as National level and also participated in many Conferences and Melas.
Innovative Ways for Developing Livelihood of Tribal Farmers and Farm Women: Smt. Jaya Devi, Munger, Bihar

Smt. Jaya Devi from Munger district of Bihar presented in details the Innovative ways of developing livelihoods of tribal farmers and farm women. Smt. Jaya Devi is a 34 years old and had formal education only upto class IV and she has chiseled her skills in improving not only her own incomes but, the whole community of the region.

She was instrumental in forming 285 SHGs in Munger district. The groups have a cumulative savings of over 2.5 crores rupees in various banks of the district. She was elected president of SHG federation. She formed 5 sub-committees to address various issues of community particularly of tribal farmers and farmwomen.

Being the president of sub-committee, Sampark Committee of SHG federation she ventured into contacts with other stake holders of the region like NABARD, ATMA and line departments of local administration. Her efforts to ensure better quality of life to disadvantaged rural families of the area through sustainable agricultural technologies coupled with NABARD sponsored watershed management projects brought a paradigm shift in agriculture practices in the area. The local community is responding to her efforts and participating in soil and water conservation measures and adopting tree (Horti-Silvi plantation) based agriculture practices.

She has been instrumental in bringing backyard poultry and goatry activities in the locality apart from other seasonal horticultural crops like vegetables & fruits including lady finger, bitter gourd, elephant foot yam, guava, papaya etc. It has been well observed through various media reports and locals that she remains the face behind the change. This area which had been witnessing women harassment, atrocities, high cost money lending activities and other anti-social activities, has come out of high cost debts and got rid of many social menace though SHG movement. The community is fighting against all odds with strong determination and dynamic leadership of Smt. Jaya, who takes pride in speaking her following catch line:

‘Daan Se Parlok Sudharta hai, Shram daan se ye lok’,
‘Mitti Pani hi jeevan hai rok sake to rok’.

She indicated that income levels of the community have risen more than 2.5 times in the last five years. Her efforts and voluntary contributions in this direction is well recognized though various awards and recognitions like fellowship of Jamsedji Tata National Virtual Academy through M.S. Swaminathan Research Foundation, Chennai in 2009 for spreading knowledge revolution in rural area. National Youth Award for Rain Water harvesting and Environment Protection for year 2008-09 in the year 2010 through Ministry of Youth Affairs and Sports, Govt. of India.

She was persuaded to take up International Training in Youth works in South Korea.
in the year 2010 in 4th Asian Youth workers training programme. This training has a very positive impact on her work in various aspects like youth development in the region. Her mission for good education and health has been a motivating force. Many young ones are getting admitted into Navodaya School in the district and the youths are getting involved in nation building activities and not getting swayed into Left Wing Extremism.

Under her leadership, 5000 hectare of Dharahara Kol’s barren land has been converted into green land. There has been over 75 ahars, 50 ponds and many gabion bunds and other water harvesting and water conservation structures created/renovated. Her efforts have been recognized in 5th Edition of Real Hero Award by CNN-IBN & Reliance Foundation in March 2012. Jaya Devi has been instrumental in bringing improved agriculture practices and better crop management techniques through KVK, Munger and BAU, Sabour, Bhagalpur by organizing Kisan Choupals and other extension activities in the region.

Bihar Agricultural University, Sabour, Bhagalpur has awarded her Innovative Farmer Award in the year 2012 on the occasion of its 2nd Foundation day celebration. Jaya Devi is known by many names in the region like Green Crusader, Saviour, Munger Masiha, Daring Angel but very aptly called the Green Lady of Bihar.

Motivating Farmers for Taking up Community Farming for Economic and Overall Livelihood Development: Shri Nawal Kishor Nath Sahadev, Lohardaga, Jharkhand

Shri Nawal Kishore Nath Sahadev is an innovative farmer who has motivated the tribal farmers of the village to take up integrated farming. The efforts of Shri Sahadev have prevented the migration of around 500 farmers besides made them self-sufficient through self-employment in their own field. His social work has not only changed the farmers of Hendlason village only, another five villages namely, Bagha, Baratpur, Kadak, Hudu and Tan have been immensely benefitted through adoption of integrated farming system. Continuous persuasion with the farmers helped them to build up social fencing in the villages to save their crops against grazing animals. In all the villages, hardly any land is kept vacant now which was beyond imagination even 2-3 years earlier as the entire area was dominated by mono-crop of paddy during kharif season only. Aided by KVK Lohardaga, he introduced SRI technique for paddy cultivation in the area for an yield difference of 40-200 per cent for the benefit of a large number farmers. Besides, commercial vegetable cultivation of tomato, brinjal, cabbage, cauliflower, pea etc. has also been possible in the villages through his direct involvement only. A tribal farmer like Birsu Oraon of Bagha village is earning more than Rs.2.0 lakh from tomato cultivation only. Marketing arrangements made by him has enabled the vegetable growers to sell their produce to the market of Rourkella, Kolkata, Patna and other places at a higher profit.
In addition to agriculture, the tribal farmers have also been united to opt for dairying particularly for the women folk. In Baratpur village only, more than 10 dairy farms are in operation for additional income and employment generation of the farmwomen vis-à-vis tribal families. Vermicompost has also become a household name in the villages. In the village Baratpur, 50 units of vermicompost production have been established by the farmers themselves after obtaining training and expertise from KVK Lohardaga. Shri Sahadev has played a crucial role of mediator between KVK and farmers. They are now selling vermicompost @ Rs.5/kg in other villages. Market for vermicompost has been explored by the tribal farmers only.

Another successful case of community approach initiated by Shri Sahadev is the arrangement of irrigation water through *borabandi* on river Koel. Turning the monocropped area into double/triple cropped has been possible by this arrangement where assured irrigation is possible. Again, joint persuasion of KVK Lohardaga and Shri Sahadev helped in installing 14 lift irrigation facility in the Koel basin for its regular use by the tribal farmers. Orchard development is the newer area introduced in the villages to provide all round support to the tribal farmers as well as non-tribal.

Group mobilization, motivation and willingness of Shri Sahadev to solve the problems of the farmers made him a true social leader. He leads from the front by adopting the practices which he is advising others to follow.

**Tractor Drawn Compressor Spray Pump:** Shri Nayan Pal Shivran of Jaipur, Rajasthan

Shri Nayan Pal Shivran, stated that he is a native of Jaipur having 5.0 hectare land under cultivation and mainly grows vegetable and cereals crops. He is qualified upto secondary level and takes advice time to time from Krishi Vigyan Kendra, Chomu. He grows vegetables on more than 1.5-2.0 ha area. Since, vegetable cultivation require time to time plant protection measure for better production. The spray by Knapsake and foot sprayer is more laborious job and time consuming and he decided to develop such mechanically sprayer which work efficiently with cheaper cost. Finally, he developed 200 liter capacity plastic water tank and operated through Tractor Compressor System. This device expanded by connection Spray Nozzle with 100-150 m plastic 1" pipe by which it can spray 1.0 ha in 1 hour without moving the tractor/machine. This spray machine discharge 20-25 lit/spray solution/minute. This system cost Rs. 15000-16000 and can be easily handled by any person.

The Knapsake spray/foot sprayer, consuming whole day to spray 1.0 ha land and three labours also required to fill up the solution and spray etc. The mechanically powered spray cost approximately Rs. 90,000/- to 1.0 lakhs which was not within the buying capacity of farmers. So Mr. Nayan Pal Shivran not only save the labour, but also increased
vegetable production by spraying with the help of this machine in time. Now, he has modified with automatic pipe folding device to fold the plastic pipe. He has developed 26 such machines and sold to near by farmers. The hiring charges for one hour are Rs. 250/hour.

**Modified Puddler and Leveller: Shri Piyushbhai Ambalal Patel of Kheda, Gujarat**

Shri Piyushbhai Ambalal Patel is an innovative farmer of village Khandhali, taluka Matar of district Kheda, Gujarat. He developed a modified puddler and leveler by adding a leveller to puddler. This has reduced the labour requirement in agricultural operations followed by time management in various activities.

For reverse leveling he has made modifications in the frame and kept the alignment frame both sides of the leveler frame. After the use of simple leveler, one has to detach the leveler and turn the leveler back and again joined it with tractor. To carry out leveling operation smoothly in every corner of the field, it helps upto great extent. Forward leveler, which is dragged by tractor, is not able to level perfectly in corner of the field. But in case of reverse leveler, reverse alignment in framing, tractor drives reverse and replace the extra soil to pit or lower patches.
In order to carry fertilizer bag and other required input easily from godown to field. This farm implement can also be attached with multi use frame for multi intercultural operations in various crops. It not only saves the money but also one can have multiple farm implements at a time. It is tractor trolley mounted iron beam, which is fitted with pulley in center of beam, can be fitted in trolley with the help of vertical rectangle support channel designed for fitting of horizontal beam fitted with pulley. It is being used by several farmers in Kheda district.

He has been instrumental in introducing the Gurjari variety of rice in the area 15 years ago, which was adopted by large number of farmers which is still very popular. He has also made modification in farm implements at his own as per his requirements and using successfully. He is source of information for the near by farmers for preparing the nursery for paddy, tomato and tobacco. Apart from this, farmers always seek suggestions and advice from him from time to time. Farmers of the area previously used excess use of chemical fertilizer in tobacco crop, which has been reduced considerably because of learning they got from Shri Piyushbhai. According to him at least 400-500 kg of the Urea/ha is saved in Tobacco crop. He is always ready for adopting new technology and sharing information.
Tricycle Weeder-An Innovation: Shri Nagalingappa Manappa Badiger, Dharwad, Karnataka

Under rainfed farming situations, timely agricultural operations play an important role. In dry land farming, sowing operations has to be completed within a short period. By traditional use of bullocks and tractors to carryout the agricultural operations, it requires more labour, more time and they proved to be an expensive one. To overcome this difficulty an innovative farmer has designed an agriculture implement to dry land farming situation with multi purpose activities.

Motor bike turned into Tricycle: Fabrication of 250 CC motor bike into a single seat tricycle fitted with necessary accessories like seed cum fertilizer drill, harrow, cultivator and hoe for different agricultural operations has ensured timely cultivation of various rainfed crops of Dharwad district of Karnataka. Sri Nagalingappa Manappa Badiger, Dharwad, Karnataka gave a detailed account of this weeder during his presentation in the session.

An old 250 cc motor bike was fabricated in to single seat tricycle. Tricycle was designed and fitted with all necessary accessories to carryout the different agriculture operations (seed-cum-fertilizer drill, harrowing, cultivator and hoeing operations).

It is suitable for crops like wheat, sorghum, bengal gram, groundnut, sunflower, linseed, safflower, onion, chilli etc. and useful for multipurpose agriculture operations in different cropping systems, economical, handy & viable, easy to operate in medium to large farm holding. He has got due recognition for his work at the state as well as at national level.

Identification of Medicinal Value and Processing of Indian Trumpet Flowers (Oroxylum Indicum): Mrs. Rose Mary Rymmnai, district Ri-bhoi, Meghalaya

Medicinal use of the Indian trumpet flower (oroxylum indicum) plant for the treatment of jaundice was presented by Mrs. Rose Mary Khongrymmai, Ri-Bhoi district of Meghalaya. The procedure for processing of Indian trumpet flower plant is as under:

- The leaves are plucked.
- It is boiled till the water turns yellow.
• During winter months, when the leaves have fallen, the bark of the tree is used in the same way as for the leaves.

• Fresh preparations are used for bathing the patient everyday.

• The boiled water is used for bathing the patient for the entirety of the sickness.

• Cost of preparing 500 ml of Indian Trumpet Flower bathing solution: Rs. 30.00.

• Selling price of 500 ml of Indian Trumpet Flower bathing solution: Rs. 45.00.

• Cost benefit ratio: 45/30 = 1.5.

**Medicinal use of the roselle (*Hibiscus cannibus*) plant for the treatment of Urinal Tract Infection (UTI):** Leaves are used in local cuisine; stem in local handicraft and the fruits are plucked around the mid of November and used in the innovation after dehydrating by sun-drying for a period of one week and dehydrated capsule is boiled till its colour
become blood red and thick in consistency before put to cool. The concoction (Roselle drink) can be drank (dose) as much as required (as one glass) in once or twice a day and its consumption has no side effects. This can be continued for at least 3 days if the patient is serious and one can prepare this concoction as much as required according to the patient’s condition. The cost of preparing of 500 ml Roselle drink is Rs. 30/- with a selling price of Rs. 50/ 500 ml of drink and the cost benefit ratio is 1:1.67.

**Water Harvesting & Women Empowerment in Nicra Village:** Shri Sant Kumar Sinha, Jehanabad, Bihar

Shri Sant Kumar Sinha highlighted various activities carried out in NICRA adopted village of the district viz. introduction of new crop varieties, intercropping, cultivation of elephant foot yam as cash crop, fodder and azolla cultivation, community nursery and livestock rearing for the benefit of large number of farmers. Mushroom cultivation, rearing of poultry with Vanaraja breeds and goatery, value addition etc. also empowered the women farmers economically.

NICRA project has been started in the village Sakrorha of Modanganj block by KVK, Jehanabad in March 2011. Prior to the adoption of this village under NICRA, the agricultural activities of this village were almost negligible due to prevailing drought conditions. Hardly 10-15 percent of farmers continued agricultural practices in their field. With the start of NICRA project, different interventions like crop management; promotion of community nursery of vegetables as an alternate enterprise; nutrition for livestock in adverse climate; natural resource management; livestock and fisheries etc. were introduced and have been yielding good results.

**Wheat Variety Baba Vishwanatha of BHU:** Shri Chandrashekar Singh, Varanasi, U.P.

Shri Chandra Shekhar Singh has developed new wheat varieties such as Baba Vishvanath, Kashi Vishvanath, Ganeshan, Devnandan.

**Baba Vishwanath (CSW-467):** This variety matures in about 115 to 120 days. The height of the plant is 90-95 cm and its seeds are very bold. In this variety, dry matter is 20% more from normal, therefore, it is suitable for fodder as well. This variety is becoming very famous amongst the farmers.

**Kashi Vishwanath:** This wheat variety is developed from HUW 234, a BHU variety. Its height is 6 inch taller than HUW 234 and have higher yield. The plant height is 90-100 cm and its seeds are bold. The average grain yield is 50-55 q/ha and days to maturity are 115-120 day. The plants are green with wide leaf and good for organic farming. This
variety resistant to diseases and also good for late sowing condition as farmers is growing it in more than 100 acre area.

**Shitala (CSW 470):** This wheat variety has been selected in the field condition. Its plant height is 100 - 105 cm. The grain yield of this variety is 50 - 55 q/ha. It also takes about 115 - 120 days to mature. The variety is very good for bread making owing to high starch content. It is also suitable for saline and less fertile soils (uzar and banjar fields). This variety is suitable for late sowing conditions and is grown by many farmers in more than 200 acre area of U.P, M.P and Bihar.

**Devnandan:** This wheat variety has also been developed by selections at farmer’s field. The plant height is 80-85 cm, yield is 50-55 q/ha, time of maturity is 115-120 days, weight of 100 grain is 6 gram and number of tillers is 8-12. It is resistant to logging and very good for bread making.

Shri Singh is distributing the seed of these varieties to the farmers of the UP and other states of the country. About five lakh farmers have been benefited by these innovations in the state of Uttar Pradesh and the country. He has participated in many krishi melas in state as well outside the state and awarded many times. He is also recipient of Babu Jagjivan Ram Award in 2011.

All the innovative farmers appreciated the efforts of concerned KVKs of their district in providing technological support, information and constant guidance in improving their livelihoods through on and off farm activities. At the end of the session, Dr. O.P. Gill pointed out the need of group formation among farmers with examples of number of successful cases.

Dr. Hanchinal remarked that, the session truly represented the bottom up approach which should be harnessed for further up-scaling of the innovations developed by farmers. He also informed that the innovations of farmers as well as their services are being recognized and UAS, Dharwad, conferred honorary Ph.D degree to four farmers in recognition of their contribution.

Dr. K.R. Dhiman advised the vegetable growers to apply vermi wash as an eco-friendly measures to control pests. He stated that horticulture is the best alternative to traditional agriculture followed by livestock and forestry.

The session ended with observation of the Chairman of assessing the adoption rate of such innovations/ practices against a fixed benchmark.

**Salient points**

- Value addition and marketing of milk and milk products in the form of ice cream gave 3-4 increased income over traditional dairy enterprises, distillation of roses fetched a profit of Rs. 5-7 lakh / acre, Improved practices namely grading, waxing, packing of kinnnow fruits, Singhade (water chestnut) flour, aonla bi-products taken
up by the farmers of different states gave many fold income and strengthened them economically and created additional employment to rural youth and farmers.

- Roof water harvesting and terrace cultivation of vegetables namely cauliflower, cabbage, chilies, tomato, pumpkin in hilly areas of Uttarakhand has showed the farmers the way to overcome water scarcity during lean period and earning additional income.

- Formation of women groups and community organization in the remote and naxal affected areas of Bihar proved successful in empowering the women against social evils and atrocities. The initiation taken by Mrs. Jaya Devi, a social worker, towards agricultural and rural development activities viz. water harvesting, water shed development project through NABARD registered group under ATMA and technological support and training from KVK changed the socio-economic scenario of the area. The adjoining villages have also followed the foot print of Jaya Devi in solving their socio-economic problems.

- Efforts made through community organization among tribals in rainfed and Naxalite affected areas of Jharkhand resulted in creation of irrigation facilities; increased cropping intensity with more number of crops; higher income (Rs. 1-2 lakh /acre) through vegetable cultivation; and adoption of SRI cultivation of paddy in one thousand acres. These interventions also checked the migration of rural youth with the support of KVK and line department.

- Innovations in farm implements and machinery for various agricultural operations like low cost tractor drawn compressor spray pump for plant protection of various crops; modified puddler and fabricated 250 CC motor bike into a single seat tricycle fitted with necessary accessories like seed cum fertilizer drill, harrow, cultivator and hoe for different agricultural operations have proved their utility in terms of labour savings and timely operations with additional benefit of earning income through custom hiring.

Recommendations

- The KVKs should indentify more number of farm innovations and best practices developed by farmers for its assessment and validation. If needed, help of SAUs/ICAR Institutes may be sought. The validated practices should be up-scaled by KVKs, ATMA and line departments for the benefit of small and marginal as well as resource poor farmers.

- Prototype of farm implements should be developed in public private partnership mode for providing such facilities to other farmers.

- Services of Innovator farmers should be utilized by the KVKs for motivating other farmers.
Farm Innovators presenting their Innovations during the session
SPECIAL SESSION

Programming Mind for Success and Unleashing Human Potential for Higher Productivity

Chairman : Dr. R. R. Hanchinal  
Vice Chancellor, UAS, Dharwad

Speaker : Shri Sunil Parekh  
M.D, Rise Development Academy, Mumbai

Rapporteur : Dr. V.P. Chahal  
Principal Scientist (AE), ICAR  
New Delhi
Mr. Sunil Parekh, Chairman and CEO of RISE Development Academy, Mumbai conducted a special session on “Programming Mind for Success and Unleashing Human Potential for Higher Productivity”. He said that success can be learnt like any other skill. Mr. Parekh stressed that most people are unaware of why things go wrong in life. For success, it is very essential to realise your inner hidden potential by awakening the power within. He discussed various principles and techniques of success, mind programming, enhancing creativity and innovation, confidence building, sound decision making, stress and emotion handling. Besides, he also demonstrated some techniques through practical exercises like fire eating, body stiffening, lifting a person with two fingers etc. The session was very interesting in terms of discussions on many personal and psychological issues, clarifications and prospects of using the techniques in personal life.
ICT Mediated Best Practices in Knowledge Empowerment of farmers

Chairman : Dr. K. D. Kokate, DDG (AE), ICAR, New Delhi
Rapporteurs : Dr. P. Adhiguru, Senior Scientist, ICAR, New Delhi
 : Dr. A.K. Singha, Senior Scientist, ZPD, Zone III, Barapani

Presentations:

   Mr. Rikin Gandhi, Chief Executive Officer, Digital Green, New Delhi

2. Role of ICT in Knowledge Empowerment of Farmers - Way Forward for KVKs
   Dr. G. Dileepkumar, Principal Scientist/Global Leader, Knowledge Sharing and Innovation, ICRISAT, Hyderabad

3. ICT and Remote Sensing Applications in Disaster Management in Agriculture
   Dr. M.V.R. Seshasai, Group Head, AS&AG, NRSC, Hyderabad

4. mKRISHI
   Dr. Arun Pande, TCS Innovation, Lab Mumbai

5. Best Practices of IFFCO Kisan Sanchar Ltd. in Technological Empowerment of Farmers
   Mr. S. Srinivasan, CEO, IFFCO Kisan Sanchar Ltd.
LEARNING is the cognitive process of acquiring knowledge or skill through study, experience or teaching, while, ICT mediated learning is a process used to acquire data, information, skills or knowledge that enables learning in a virtual world where technology merges with human creativity to accelerate and leverage the rapid development and application of deep knowledge. ICT based learning covers a wide set of applications and processes such as Web based learning, computer mediated learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio and videotape, satellite broadcast, interactive TV, PDA, mobile phone, CD-ROM and other available technologies.

ICT mediated learning provides utilities for achieving goal of education for all, and in turn acts as an enabler in reducing the digital divide, plummeting poverty and promoting socio-economic empowerment. But, the integration of ICT in education needs considerable investment in time and resources. Consequently, during planning to integrate ICTs in evidence-based information for making sound decisions by the end users calls for extensive research and sharing of critical information along different phases of planning. Furthermore, implementation of ICT based learning demands in-depth analysis and intelligent feedback from the processes.

The usefulness of ICT in extension management has also been felt in the recent past to speed up the process of technology dissemination in agriculture to harness the full potential of latest technologies being developed by National Agricultural Research System. KVKs in particular could play a vital role in this sector owing to their network in every corner of the country. Therefore, a special session on ICT Mediated best practices in knowledge empowerment of farmers was hence held in the 7th National Conference on KVK to have deliberations on this important aspect.

This session was chaired by Dr. K. D. Kokate, DDG (AE), ICAR and five presentations were held under this session. The details of the deliberations under this session are as under:

**Best Practices of Digital Green: An Alternative Approach in Agricultural Extension:** Mr. Rikin Gandhi, Chief Executive Officer, Digital Green, New Delhi

The speaker presented a significant work done by Digital Green for promoting agricultural extension. He stated that Digital Green was incubated in Microsoft Research India’s Technology for Emerging Markets Team in 2006 and has been functioning as independent non profit organization. It uses information and communication technology to improve the social-economic and environmental sustainability of small farmer livelihoods. The organization aim to raise the quality of life of people through targeted production and dissemination of agricultural information through a cost-realistic medium of participatory video and mediated dissemination in partnership with local, existing people-based extension
systems of civil society organizations and governments. The system comprised of participatory process for content production, locally generated digital video database, human-mediated facilitation for dissemination and training, and structured sequencing to sustainably engage communities. Digital Green has primarily scaled by building on its partnerships with seven non-governmental organizations- PRADAN, BAIF, Samaj Pragati Sahayog, ACCESS, Action for Social Advancement, PRAGATI, and VARRAT - and recently began a partnership with the Government of India’s National Rural Livelihood Mission. Digital Green currently reaches over 900 villages and 60000 farmers in the country and is extending to parts of Sub Saharan Africa and South Asia.

He highlighted the importance of video based approach which has several important advantages to traditional forms of agricultural content. Video creation tends to be faster and less expensive than other types of media, as advanced preparation in “lesson”-planning can minimize post-production editing.

He stressed upon that demonstrative exhibition no doubt is the best practice to convince the farmers about the new farm technologies but requires unattainable human resources, sufficient time and financial backup. Video can compress the time needed to reveal the changes and provides a means of bringing relevant demonstrations into the homes of farmers. Video recordings encourage the coalesce of scattered information into a systematic and comprehensive format with a localized context. Mr. Gandhi informed that the recordings in the Digital Green database are made by the experts at the grassroots level and expert reviewers ensure the accuracy, clarity, and completeness of the content, and guide the construction of a time- and location-sensitive video-based curriculum.

The principal means of disseminating content from the Digital Green database is shipping DVDs to a village. Villages are provided minimum of a TV and DVD player operated by NGO field staff and managed by local farmers. The night showings usually involve small
groups of 10 to 20 farmers willing to come together at a common place within short distance of their homes. These groups serve as informal farmer training schools in the evenings and are complemented by field programs in daylight hours.

He also stated that introducing a village to new practice does not occur over a single night screening. The screening of content should follow a sequence that prompts interest and leads to adoption. The approaches which worked well when entering a new village include entertaining clippings, such as a women group singing folk songs, to attract an audience; testimonials and interviews with progressive farmers that disclose the concepts and experiences associated with the practices; 3-5 minute highlights of a broad spectrum of the proposed practices; comparative demonstrations with progressive farmers that visibly (perhaps, to a humorous extent) show the benefits of the practices; familiar farmers from the local vicinity (preferably, the same village) attempting the practices; and experts detailing concepts and step-by-step instructions for the practices.

He also said that communities may be approached by organizing a village gathering in a central location to showcase highlights of the services that will be provided. Identify interested farmers through extension staff introducing a particular practice to these farmers on the field. Now, informally screen content of peer farmers and experts demonstrating practices to various areas of a village and introduce small groups of interested farmers with a regular schedule of content screenings and motivate community participation by generating a local competition to learn, adopt and innovate better agricultural processes.

Extension workers use the programming as a tool to disseminate content to a larger audience while maintaining personalized support and encourage farmers to attempt processes on their own and announce their availability to individually visit farmer plots as required. The emphasis was focused to motivate farmers to adopt relevant new techniques with clarity and completeness, particularly when they observe their peers benefiting from them.

Mr. Gandhi clarified that the Digital Green database is not intended to be a physically centralized system. Instead, it is designed to work as a decentralized network of hubs and spokes. Each hub is a demonstration village, which is transformed into a center of excellence through the concerted efforts of NGOs and experts and the hubs themselves are
“networked” together. The spokes are typically neighboring villages that also need help but which are difficult to reach because of lack in expert resources. Each hub is responsible for expert content production for the local region, content distribution in its local neighborhood, teacher training and interactions with other hubs. Recording hubs in which field extension activities are concentrated provide a sequential stream of new content that can be screened to surrounding hubs and spokes. He said that the hubs-and-spokes model has effectively scaled up the Digital Green system.

Regarding the impact of the technology, he stated that over the last three years, network of partner extension systems and communities has produced over 2,200 short, 8-10 minutes videos which have been found to be 10 times as effective, per dollar spent, converting farmers to better farming practices than traditional approaches to agricultural extension.

### Role of ICT in Knowledge Empowerment of Farmers - Way Forward for KVKs:
**Dr. G. Dileep Kumar, Principal Scientist/Global Leader, Knowledge Sharing and Innovation, ICRISAT**

The speaker shared the experiences of ICRISAT on role of ICT in knowledge empowerment of farmers and its application for rapid technology dissemination. After a brief introduction of ICRISAT, he said that the Virtual Academy for the Semi-Arid Tropics (VASAT) was initiated in 2002 with a view to leveraging Information and Communication Technologies (ICT) mediated Open and Distance Learning (ODL) methods to reach drought information to a large section of communities in a short period of time. Its objective is to create demand-driven content that can be localized to suit the rural communities and their intermediaries, to convert the scientific know-how to
field-level do-how. VASAT is a strategic coalition of national and international organizations that deals with information, communication and non-formal distance education. The coalition is led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and is jointly implemented by the International Livestock Research Institute (ILRI) and the International Water Management Institute (IWMI) and leaders among the national agricultural research systems.

The Aadarsha Welfare Society (AWS) located in Addakal and functional in 37 villages was associated as a key partner in the use of information to enhance drought preparedness. Hub-and-spokes model has been applied to facilitate the information flow into the study area. The hub is generally a set up with reasonable computing facility and Internet access. This is where the value addition to generic information derived from the networks is carried out and location-specific information is generated. Rural access points are linked to this hub by telephone. Volunteers at the rural access points receive location-specific information from the hub and deliver it to rural families in a variety of ways (blackboards, public speakers etc). The bottom-up approach involved local volunteers collecting information from different sources, such as the nearby markets, government departments and traders.

Most of the information needs of typical rural residents are met by approaching family members, neighbours or friends (who themselves are not well informed in most cases). At a secondary level, the farm input suppliers; local shops and markets act as important and credible sources of information. Technical information on agriculture, available with a range of agencies is not easy to access by most rural families. This compounds
the problem of information poverty in particular. As a first step, it is decided to strengthen the access to crop-related information, which is the core of a drought information system.

In view of the widening Extension Officer to farmer ratio (1: 2000) and contact intensity of 40 minutes/farmer/year by Government Extension, it is imperative that ICT can play a vital role for sustainable development. He also stressed upon that to achieve a contact target of 3 hours/ farmer/ year, it requires 675000 extension personnel which indeed is impossible. Hence, the role of newer ICT approaches to achieve the targeted assignments is of utmost value.

In view of this, ICRISAT has started KSI Connect – A Virtual Knowledge Series (http://ksiconnect.icrisat.org) from ICRISAT for the faster and effective technology dissemination. ICRISAT has focused on affordable and light weight technologies while commissioning the platform.

ICRISAT has also started e-learning courses on agriculture that includes general information on the crops, cultural management practices, production constraints such as biotic and abiotic stresses, relevant reference material and video clippings on the relevant topics.
He made a mention of the approach adopted by ICRISAT i.e. RLO technology which is a new paradigm in lifelong learning. RLOs are the e-learning resources available freely and openly to anyone who can use, reuse, remix, recycle and redistribute it in restricted or unrestricted manner.

The important characteristics of RLOs include 1) Digitally available online 24/7; 2) Self contained- each learning object can be taken independently; 3) Reusable – a single RLO may be used in multiple contexts for multiple purposes; 4) Searchable easy to found learning material; 5) RLO is tagged with meta data; 6) RLO are small units of learning (5-15 minutes) that do not overload a learner with content; 7) Flexible- easy to update and change; 8) Standardized-adopt the same organizational structure; 9) Can be aggregated-learning objects can be grouped into a large collection of content, including traditional course structures; 10) Provide interoperability-blend into Learning Management Systems (WevCT Vista, Moodle); 11) Suited to address a new type of learner- “Net generation learner” adapted to multi tasking and digital technologies; and 12) Enhance student-centered learning.

A platform called AgriLORE (www.agrilore.org) was developed to create the learning material in the form of RLOs. AgriLORE portal has also been designed and implemented to have provision for creating profiles for courses, this is anticipated to support open and
distance learning. He also presented the way forward for KVKs which include electronic KVK governance platform, knowledge sharing platform for KVKs (KVK Connect - a virtual knowledge series platform; KVK Net - Social Networking Platform and both farmer and KVK personnel profile), Open Access Repositories, KVK Open Courseware Platform and location specific ICT4D models etc.

**ICT and Remote Sensing Applications in Disaster Management in Agriculture: Dr. M.V.R. Seshasai, Group Head, AS&AG, NRSC, Hyderabad**

Speaker addressed the role of ICT and Remote Sensing Applications in Disaster Management in Agriculture. He said that with changing climatic conditions, the rural community is facing uncertainty in their livelihoods. People need timely information to combat such situations. Geo-ICT (location based services, spatial decision making and geo-computations) and Sensor Network (distributed sensing units pertaining to weather, crop and soil parameters under micro-climatic conditions) are promising real-time information gathering and dissemination technologies towards developing solutions for majority of the agricultural processes on a real-time basis.

‘Geo-informatics’ has emanated in the form of satellite remote sensing, Geographical Information System (GIS) and Global Positioning System (GPS). These technologies could play a vital role in providing comprehensive information on various natural resources management, monitoring and sustainable development in the new millennium. The speaker threw light on how the science of remote sensing could play a vital role in strengthening the National Extension System to reach out the farmers across the locations in addition to effective planning and execution of the programmes.

Various satellites and sensors on-board provide with numerous possibilities of analyzing the data for disaster prediction and mitigation purposes. Integration of remote sensing with GIS and web technology makes it an extremely powerful tool to identify indicators of potential disasters. Information sharing through Internet reduces data acquisition time and thus providing efficient way to carry out real time disaster predictions (floods, forest fire, tsunami and hurricane etc.). Changing land use and assessment of its impact on the system in general within reasonable time frame and with greater degree of accuracy becomes possible with new technology.

He however, stressed upon the need for multi-sensor observation network (DOS-ICAR -SAU – IMD collaboration), real time space and filed data access, large area crop monitoring and modeling framework, crop modeling integrating space & field observation, automated information generation and knowledge discovery and disseminate customized products (BHUVAN, MOBILE, TRADITIONAL Approach).
ICT Mediated Best Practices in Knowledge Empowerment of farmers
mKRISHI: Dr. Arun Pande, TCS Innovation Lab Mumbai

Dr. Arun Pande, TCS Innovation Lab, Mumbai presented significant work being done by mKrishi on agricultural extension for the benefit of masses. He presented a brief account of mKrishi activities and stressed upon the potential of mobile phones for information dissemination in the rural areas which has remained largely unexplored despite the penetration of mobile phones in these areas mainly due to diversity in language, inability to localize and personalize services in order to address individual needs. He informed that TCS’ mKRISHI® platform uses mobile technology to cater the absolute needs of the rural sector.
He told that mKRISHI® serves to achieve farmer specific solutions in local language by reaching farmers individually to understand their needs. It is an innovative platform that delivers services to rural communities and connects farmers with a variety of stakeholders, packaging multiple services through communication devices like mobile phones. It can also integrate wireless sensors and script technology with communication devices to provide an enhanced solution.

He pointed out that technology convergence emphasize upon Mobile-to-web console, Automatic Weather Station (AWS) and sensors integration, complex parametric device integration, research content integrations & linkages, enterprise back-end integration, Geographical Information System (GIS) and local language renderers.

Apart from the technological innovation, mKRISHI® has enabled the possibility for information exchange between various stakeholders of the rural economy. Many agri-input companies, rural banks, insurance companies, governments and agricultural universities find it convenient/ economical to reach a group or individual farmers using TCS’ mKRISHI® platform and can be customized according to the needs of each customer.

He also mentioned the various other services of mKRISHI portals viz. mKRISHI® Lite, mKRISHI® Regular, mKRISHI® Plus which can serve as a vital link for the overall benefit of various stakeholders. He suggested that mKRISHI for KVKs can serve for personalized service dissemination, customized fertilizer advice, market linkage to improve income, introduce GAP certification and transfer “latest techniques” from lab to land. Overall, TCS’ mKRISHI® platform integrates multiple technologies to empower farmers with vital information based on specific needs like weather, fertilizer usage and pest control. It allows them to check for information in their local languages with image and voice through mobile phones and provides the relevant information. The convergence of these critical technologies with specific personalization and scalability benefits both customers and farmers.

Best Practices of IFFCO Kisan Sanchar Ltd. in Technological Empowerment of Farmers: Mr. S. Srinivasan, CEO, IFFCO Kisan Sanchar Ltd.

The speaker made his presentation on best practices of IFFCO Kisan Sanchar Limited in technological empowerment of farmers. He gave an overview of IFFCO services, vision and elements of success with special emphasis on IFFCO Kisan Sanchar Ltd.

IFFCO KISAN SANCHAR Ltd. (IKSL) is a subsidiary promoted by IFFCO to foray into low cost telecom expansion in rural India. All telecom companies today are exploring expansion plans in the rural market. IFFCO explored the possibility of tying up with telecom services providers to provide such infrastructure facilities in the villages making co-operative
societies a vehicle for economic development of the rural areas. Amongst the various means of communications available, IFFCO narrowed down on mobile telephony given the ease with which communication through mobile phones could be made available in far flung areas of the country. Telecommunications is a fast growing arena to transform Indian rural landscape. In the recent years, it has demonstrated its potential to play a vital role in contributing the empowerment of people living in Indian villages. Indian Farmers Fertilizer Cooperative Limited (IFFCO) together with telecom giant Bharti Airtel and Star Global Resources Ltd., has promoted IFFCO KISAN SANCHAR Ltd. (IKSL) as a joint venture. Airtel is extending its network backbone to IKSL and also provide a sustainable income generating business opportunities to cooperative societies. In this model, the telecom products of Airtel are made available to farmers. The same sim card which is used for communication is turned into power house of knowledge for empowering people living in villages through relevant and pertinent information which is being provided by IKSL through Value Added Services (VAS).

In addition to large number of programmes like field demonstrations, campaigns, soil testing critical input package, medical campaigns, village adoption, farmers trainings etc., IFFCO has distinction of floating several institutions of focused programmes targeting rural India like CORDET, IFFCO foundation, Kisan Sewa Trust and IFFDC. Unique initiatives have also been launched through subsidiaries like free insurance coverage under “Sankat Haran Bima Yojna” and commodity trading. IFFCO was amongst the first in India to have realized the importance and benefits of information and communication technologies (ICT) for the overall development of rural India and has implemented special project under “ICT initiatives for farmers and cooperatives”.

Lack of communication infrastructure is a major challenge and is a serious impediment in taking the fruits of ICT to rural parts of the country. Majority of the villages which form bulk of India, fall abysmally short to basic source of quality communication. IFFCO has
realized that absence of reliable medium as well as appropriate services of relevance to ride over it have been acting as a major bottleneck. The need of the hour is to take valuable information inputs to farmers directly to their ears and eyes. IKSL has been formed with an exclusive mandate to design, develop, source and supply state of the art, economical and rural communications with value addition of content and services. The various services for subscribers of IKSL include free voice messages; helpline; call back facility; and phone-in-program on specific subjects of interest to farmers, mobile based quizzes etc.

To further improve the effectiveness of its services, IKSL promotes focused communities or groups with common interest such as sheep and goat rearing, dairy, fisheries etc.

He also emphasized upon the measures for quality services which include:

- Message subjects are planned in advance in consultation with experts. Planners/crop calendars are prepared by experts.
- First drafts of voice messages for one minute duration are prepared in local language and messages are vetted by experts.
- Messages are based on felt needs and field information received through farmers on helpline and also through officials. Messages are recorded according to priority and region specific messages of topical interest are broadcasted, addressing different needs of farming communities.
- Farmer’s field visits to study the impact of IKSL services are conducted which will also facilitate gathering of information needs.
- Efforts are made to offer quality processes and periodic audit by experts and continuous training programmes for content team.
• All the voice messages, helpline queries with solutions, feedback are data based.
• Periodic studies are conducted to study the impact, assess the effectiveness and undertake improvement measures.

He also made a mention of successful “m Extension” KVK–IKSL collaboration through Zonal Project Directorate, Jodhpur involving 6 KVKs of Gujarat and 19 KVKs of Rajasthan.

Recommendations

The Chairman emphasized that ICT-based education and training leads to improved learning environment. However, as with most research on education and technology, the effectiveness of ICT-based mass learning is still fragmented. It is suggested that learning with ICT leads to more reflective, insight learning with more empowered and democratic diffusion amongst learners. The following recommendations are drawn from these presentations.

• The experiences of “Digital Green” in documentation of best practices through community participatory video clips provide scope for interactive and horizontal learning. Such ICT mediated approach can be further tested and refined by KVKs in public-private partnership mode to establish its relevance in field extension.
• Research on ICT application in terms of cost effective information acquisition, improving efficiency of KVKs, impact of ICT interventions and linkages with organizations need to be strengthened.
• Strategic collaboration of partners is to be encouraged for ICT based knowledge modeling in view of local knowledge base, local needs and research-based outputs as well as socio-economic and cultural factors, besides content and capacity building of the partners.
• Innovations in Mobile-based information system have tremendous scope of more coverage of farmers, last mile connectivity and interactivity. The experiences of mKRISHI and IKSL are encouraging and can be further improved based on feedback and public private partnership.
• Capacity building of KVK staff through ICT mediated tools may be encouraged for data acquisition, processing, analysis, and sharing from remote sensing for effective functioning of KVKs.
Chairman: Dr. A.K. Singh, Vice Chancellor RVSKVV Gwalior

Panelists:
- Dr. A.M. Narula, ZPD, Zone – I, Ludhiana
- Dr. A.K. Singh, ZPD, Zone – II, Kolkata
- Dr. N. Sudhakar, ZPD, Zone – V, Hyderabad
- Dr. Y.V. Singh, ZPD, Zone – VI, Jodhpur
- Dr. Anupam Mishra, ZPD, Zone – VII, Jabalpur
- Dr. Srinivasa Rao, Principal Scientist CRIDA, Hyderabad

Rapporteurs:
- Dr. C.V. Sairam, Principal Scientist, ZPD, Zone – VIII, Bangalore
- Dr. S.R.K. Singh, Senior Scientist, ZPD, Zone – VII, Jabalpur

Presentations:

1. Consolidating the Gains of NICRA Project-Lessons for Up-scaling
   Dr. Srinivas Rao, Principal Scientist, CRIDA, Hyderabad

2. KVK Experiences in Promotion of Climate Resilient Technologies
   Krishi Vigyan Kendra, Tumkur (Hirehelli), Karnataka
   Krishi Vigyan Kendra, Namakkal, Tamil Nadu
   Krishi Vigyan Kendra, Baramati, Maharashtra
   Krishi Vigyan Kendra, Satna, Madhya Pradesh
   Krishi Vigyan Kendra, Datia, Madhya Pradesh
   Krishi Vigyan Kendra, Gumla, Jharkhand
   Krishi Vigyan Kendra, Nimpith, West Bengal
   Krishi Vigyan Kendra, Dhubri, Assam
   Krishi Vigyan Kendra, Uttara Kashi, Uttrakhand
   Krishi Vigyan Kendra, Kullu, Himachal Pradesh
   Krishi Vigyan Kendra, Bharatpur, Rajasthan
A View of Technical Session
The session commenced with the opening remarks by the Chairman, Dr. A.K. Singh, Vice Chancellor, RVS KVV Gwalior highlighting the success of NICRA project across the locations. He appreciated the efforts of KVKs for its success. He stated that though only 100 most vulnerable districts have so far been selected under NICRA owing to limitation of funds, but more KVK need to be covered across the country. He requested all the speakers to stick to time by presenting only the salient achievements. In all, 12 presentations (one by Dr. Srinivasa Rao, Principal Scientist, CRIDA and 11 by the PCs of KVKs) were made during the session. The details of these presentations are as under:

Consolidating the Gains of NICRA Project-Lessons for Up-scaling: Dr. Srinivasa Rao, NICRA Project, CRIDA, Hyderabad

Dr. Srinivasa Rao highlighted the major objectives of NICRA project including the strategic research and demonstration of specific technological packages for coping up the climate vulnerability in farmers fields; empowering the farmer’s technical skills and working of Village Climate Risk Management Committee (VCRMC). He stated that the entire technological demonstrations implemented by the KVKs in NICRA villages are classified into four major heads viz., Natural Resource Management, Crop Production Technologies, Livestock Production & Management and Institutional Interventions. The major technologies demonstrated by the KVKs include rainwater recycling, climate adaptation through crop varieties, altering sowing time, sowing of direct seeded rice, creation of community based nursery for staggered seedling production, convergence with other government schemes like Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), integrated farming systems, establishment of water harvesting structures, livestock production & management and popularization of latest farm machineries on custom hiring basis. Dr. Rao also highlighted the role of VCRMCs and their official set up for helping the farmers. He further stated that certain KVKs took lead in reducing the wastage of crop residues and the income earned through custom hiring centers is to the tune of Rs.13 lakhs. Further, KVKs are also involving themselves in studies on carbon balancing and they are striving for reduction of carbon emission through promotion of balanced fertilizers. Introduction of drought/flood tolerant varieties is also being done in coordination with various line departments. While highlighting the key features and major objectives of NICRA he informed that some of the value added outputs from NICRA interventions were prevention of crop residue burning in NICRA villages especially Gaddipally (KVK, Nalgonda, Andhra Pradesh), Banaganapally (KVK, Kurnool, Andhra Pradesh) and Durgapur (KVK, Amravati, Maharashtra).
Crop residue Incorporation with Rotavator

Greengram crop residue incorporation in the soil after harvesting

Preparation of compost pit with Maize crop residues,
He also made a mention of the utility of custom hiring centers in the changing scenario of climate change as there is emerging need for timely operations, conserve the soil moisture and other farm operations in a limited way atleast. He indicated that carbon balance studies are essential as agriculture can play an important role in mitigating three greenhouse gases viz. carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), reducing emission through balanced fertilization. For this, zone wise convergence and activities are being undertaken in order to upscale the impact of NICRA activities.

Some of the key impact examples of NICRA include:

- Two coastal districts of Andhra Pradesh were included for flood and cyclone vulnerability.
- Flood tolerant varieties, K application reduced lodging, drainage line provided under NRM saved 300 acres of land.
- Post flood situation management was also dealt with care and extension visits. Six coastal districts with ICAR, Agricultural Universities, ZPD, KVKs, AICRP centers are collaborating in the work.

**KVK Tumkur (Hirehelli), Karnataka**

Dr. L.B. Naik, Programme Coordinator highlighted the NICRA activities undertaken by KVK. The project was implemented in D. Nagenahalli village where the major climate challenges were drought, dry spells and extreme temperature. The major achievements include promotion of water conserving technologies such as contour bunding, stubble mulching, cover crops, establishment of rain water harvesting structures, farm ponds, percolation ponds, check dams, water storage structures for recharging of bore well, reviving the defunct wells, increasing the height of existing check dams, promotion of drip and sprinkler irrigation for field and horticultural crops, promotion of drought resistant varieties such as MI365 in ragi, BRG 2 in redgram, MAS 26 aerobic paddy, promotion of agro-forestry and Integrated Farming Systems etc.
The major climatic challenges, their consequences and NICRA interventions to tackle with these challenges in Tumkar district are given in the following table:

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Major Climatic vulnerability</th>
<th>Consequences</th>
<th>NICRA intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Soil degradation</td>
<td>Soil erosion, Graviliness, Loss of soil fertility, Loss of soil productivity Soil salinity</td>
<td>Soil conservation measures, Silt application, Green-mannuring &amp; Composting, Microbial consortium, Salt tolerant crops</td>
</tr>
<tr>
<td>2.</td>
<td>Water scarcity</td>
<td>Less percolation, Runoff, Receding ground water Level, Drying water bodies</td>
<td>Percolation ponds, Trench cum bunding, Recharging of bore wells, Check dams, Farm ponds, Desilting &amp; repair of water bodies</td>
</tr>
<tr>
<td>3.</td>
<td>Drought, Heat wave, Dry spells, Delayed monsoon</td>
<td>Stunted growth, Flower &amp; fruit drop, Low yield</td>
<td>Drought tolerant varieties, Short duration varieties, Aerobic paddy &amp; Pest &amp; disease, high temp. resistant varieties</td>
</tr>
<tr>
<td>4.</td>
<td>Decreasing green cover &amp; deforestation</td>
<td>Low carbon sequestration, Adverse microclimate</td>
<td>Tree based farming System, Agro forestry, Social forestry, Agri-Horti-Silvi-Pastural system</td>
</tr>
</tbody>
</table>

The technologies demonstrated under the project for National Resource Management include trench cum bunding, land leveling, tank silt application, ploughing across the slope, contour bunding, live bunds, crop and stubble mulching, rain water harvesting structures, percolation ponds, check dams, concrete water storage structures, blocking leakage of lake, stone pitching, concrete works & heightening of check dams, desilting & widening of farm ponds/ lakes, drip & sprinkler irrigation system and compost production units etc.
The most important crop interventions under NICRA village undertaken by KVK included introduction of finger millet cultivar ML-365, maize cultivar NAH 1137, groundnut cultivar GPBD-4, red gram cultivar BRG-2, aerobic paddy cultivar MAS -26, tomato cultivar Arka Meghali and chilli cultivar Arka Lohit etc. The cropping systems interventions viz. intercropping of ragi + red gram (4:1), maize + red gram (4:1) and groundnut + red gram were also conducted in the village.
The horticulture/forestry based interventions were demonstrated in the NICRA village which increased the vegetative cover, improved the micro climate, and increased the organic carbon sequestration.
Two interventions on integrated farming systems involving new enterprises i.e. bee keeping and fish farming were introduced in the existing crop and livestock based farming systems. In order to meet the demand of fodder in the NICRA village, demonstrations’ on fodder crops like napier grass- Co-3, fodder maize- PC 23 and guinea grass -Hemil were conducted. To make farmer aware about the judicious use of fertilizers on soil test basis, trainings and demonstrations especially on soil sampling were organized.
Custom hiring centre was also established under NICRA and separate bank account for the revenue received from this service has been opened in the bank. A small weather station has been established for providing necessary weather information on rainfall, maximum & minimum temperature and wind direction. The VCRMC has been constituted in the village and decisions regarding the interventions were taken in the participatory mode.
Many dignitaries have visited the NICRA village and interacted with the farmers. In addition, delegates from Ghana (Africa) also visited to NICRA Village.

**Some of the lessons learnt are:**

- Custom hiring centre saved labour cost and potential use of water tank for watering.
- NRM interventions are crucial to build resilience against climate variability.
- Farm pond and check dam helps farmers for supportive irrigation to crops, recharge the underground water and increases the cropping intensity.
- Tree spp. planted on the bunds increased the vegetative cover and met the fodder requirement of the village.
- Performances of improved varieties of ragi, red gram, groundnut, paddy, maize etc., are significantly superior to local varieties.
- Arrested the soil erosion by trench cum bunding, leveling, cover crops.
- De-silting and widening of channels increased the water storage capacity.
- Drip and sprinkler irrigation increased the irrigation efficiency and covered more area.

**KVK Namakkal, Tamil Nadu**

Dr. B. Mohan, Programme Coordinator, KVK Namakkal presented the salient achievements of technologies demonstrated in Vadavathur village of Namakkal district under NICRA project. Under this project, various technologies were promoted through demonstrations. Villages Vadavathur & Jambumadai of Vadavathur panchayat is located at 11° 92’ 41” N latitude and 78° 11’ 917” E longitude at 531 MSL with a population of 2850 (869 households). Major challenges observed in the village were drought (frequent dry spells above 20 days), less rainfall, cultivation of only one crop (onion/ sorghum) and migration of farmers to urban areas for earning livelihood. Emphasis was therefore, laid upon natural resource management under which community and individual water ponds were made. This, not only led to improvement of water table as evident from raise of water table by about 8-12 feet in various water bodies but, also increased the area under crops.

In crop production, the technologies demonstrated include drought resistant crop varieties TMV 13 and CO 6 in groundnut, intercropping of groundnut with red gram and ground nut seed production. Emphasis was also laid upon conservation of groundnut haulms. These varieties not only suited well to the local conditions but also resulted in higher yields and increase in area under these crops. Based on past 17 year (1994-2011) rain fall data, 2nd or 3rd week of August is optimum time of sowing for rainfed crops. TMV 13 resulted in pod yield of 1600 kg/ha compared to 1125 kg in TMV 7 and the haulm yield recorded was 3125 kg/ha in TMV 13 compared to 1900 kg in TMV 7 when
sowing was done between July 15th to 30th advanced by one month. Dry Spell observed from 20th July to 15th August and the maximum temperature of 37.9 °C and 39.5 °C was observed during July and August. The rainfall in the area is 348 mm with only 26 rainy days during the crop season.
In case of onion, life saving irrigation facilities through poly lined ponds not only increased the yields but also improved per unit production. Mobile sprinklers to combat frost injury and rope method for the management of tip drying in onion were demonstrated which resulted in prevention of losses worth 3 tonnes in 24 acres. Apart, drip irrigation in onion was also demonstrated for enhancing water use efficiency in 4.35 acres.
In case of flowers, demonstration on drought tolerant cultivars of jasmine (Ramanathapuram) and tuberose (Prajwal) resulted in 67.2 and 87 % survival compared to 33 and 64 % survival earlier. To promote fodder cultivation, 89000 slips of bajra napier grass (CO 4) and 29.5 kg multiple fodder sorghum (COFS 29) was demonstrated in 5.3 and 7.0 acres, respectively; which resulted in higher survival and higher yields of 25 tonnes per acre. Fodder seeds amounting 6318 kg was also supplied to various agencies from the village.

Promotion of artificial insemination through trained village youth, mineral mixture supplementation for animals to reduce the infertility rate, popularization of Namakkal 1 poultry birds etc. were the other salient technologies demonstrated in the village. Programme for genetic up-gradation of goat (Tellicherry, Sirohi) and sheep (Nari Swarna), new slatted floor shed for goat housing to reduce kid mortality and mineral lick making for self employment of rural women were also undertaken.
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Nari Swarna x Meicheri

Tellichery x Native black

Old goat shed

New slatted floor shed
To combat the problem of mortality due to predators (upto 35%) semi intensive housing of Desi chicken (Rs.3500/ 100 birds); breed improvement of Namakkal Chicken 1; community incubator (hatching capacity of 400 birds); alert vaccination system for Ranikhet disease free village etc. were the key activities to promote the poultry farming in the village.

Vermi-composting through silpaulin bags (10 units) was also demonstrated. The KVK has excellent convergence mechanism with all the line departments and especially with the MNREGA and Lead Bank. Many capacity building programmes were organized apart from regular Farmer-Scientist meets in NICRA village. Integrated Farming System (IFS) in drought areas was identified as a key component for success.
KVK Baramati, Pune, Maharashtra

Dr. T. A. Kadarbhai, Programme Coordinator, KVK Baramati, presented the salient achievements made under NICRA project being implemented in Jalgaon KP village of Pune district in Maharashtra. She informed the house that the district has an average rainfall of 537 mm and the deficiency from the normal is up to 35 percent. The number of rainy days has reduced and the number of dry spells has increased and they are mostly coinciding with the critical growth stages of major crops. The source of irrigation in the village is open wells. The major emphasis under the project therefore, was on drought mitigation and water management.

The major interventions undertaken in the project include desilting of water harvesting structure; application of tank silt to barren land; in situ soil moisture conservation; promotion of drought tolerant bajra (ICTP 8203) and rabi sorghum (Phule vasudha) varieties; intercropping; silage making; use of area specific mineral mixture to reduce repeat breeding in cross bred cows and to boost up immunity; vaccination of cross bred cows to prevent Theileriosis (Tick born disease); seed production of wheat and jowar; and use of mole plough.

Salient achievements

In the NICRA village, there is one stream and one small river on which six K.T. Weirs have been constructed by irrigation department to raise the level of water upstream and one cement check dam constructed by agriculture department in 1990 to 2000. The check dam was silted due to soil erosion so, the capacity of the check dam was reduced by 60%. The best way to cope with this climatic challenge was to conserve the water in the check dam and use available water most efficiently. Irrigation facility in the field crops is limited only during the good rainfall year. Farmers were wasting the irrigation water by flood irrigation. There were only 3 sets of drip irrigation in the village & water is salty so,
water cannot be used in summer season & at the time of germination because of its bad quality.

Dairy farming is a major enterprise in the village for income generation but repeat breeding due to mineral deficiency and Theileriosis were the major problems in dairy cattle. After identification of major problems, KVK decided to conduct different interventions in Jalgaon KP village under NICRA to increase the water availability & water use efficiently. Awareness among farmers was created by frequent meetings, trainings and exposure visits. The KVK implemented the following major two programmes:

**De-silting of check dam to increase its water harvesting capacity and application of tank silt to barren land etc.**

Due to silting of check dam and no maintenance by the irrigation department, water harvesting capacity was reduced by about 60%. Consequent upon NICRA project intervention, 47,759 m$^3$ silt was removed from 06 check dams hence, increased the water harvesting capacity by 47759 m$^3$ i.e. about 50-60% of total capacity of the structure. The available good quality tank silt (22266 m$^3$) was applied on 35 farmers’ field due to which 28.8 ha barren land was also brought under cultivation.

The intervention enabled farmers to provide protective irrigation to kharif and rabi crops over 34.5 ha area of which 24.6 ha area came under irrigation in summer season. Water level of open wells increased by 7-10 ft as compared to open wells near to other streams, where de-silting work was not carried out and new open wells were also sanctioned under MNREGA. A large portion of barren land was also converted into cultivable land after tank silt application and crops like bajra, jowar, and onion are being cultivated.
Tank silt application on barren land in Jalgaon KP NICRA village.

Increase in water harvesting capacity in Jalgaon KP NICRA village

In-situ soil moisture conservation for rabi jowar:

As sowing of rabi sorghum is done on available moisture and the rains received in the months of September and October are significant for good crop; but in rainfall deficit years these crops usually fail resulting in losses to the farmers. To combat this, large flat beds of 20 x 12 m were prepared with ridges across the slope on field in the month of May. The rainfall received during monsoon was totally conserved in these beds avoiding runoff. The yields obtained following this in-situ moisture conservation technique were quiet encouraging.

Bumper crop of sorghum in the in-situ moisture conserved field

Vaccination of cross bred cows to prevent Theileriosis and use of area specific mineral mixture to reduce repeat breeding:

In cross bred HF cows, Theileriosis was a major problem in summer season due to tick bite. Under the project, 210 cross bred HF cows were vaccinated for Theileriosis with
Rakha Vac-T for the first time in the village. This resulted in 100 percent prevention of Theileriosis in cross bred HF cows and also created awareness amongst the farmers regarding the importance of vaccination in the village. Repeat breeding due to deficiency of minerals in crossbred HF cows was mainly due to low intake of minerals and was a major problem. KVK Baramati developed area specific mineral mixture for cross bred cows and used in NICRA village which resulted in reduction of repeat breeding by about 75 percent and increased milk yields by about 15 percent.

**Use of mole plough:**

Mole plough (sub-soiler) was used to break hard soil pan at 3 ft depth which helped in draining out excess salts from soil in rainy season and improved problematic soils. This also enabled farmers to sow their crops at least 15 days prior to the traditional method.

**Introduction of lucerne variety RL-88:**

Introduction of lucerne variety RL-88 in an area of 1.2 ha increased balanced fodder availability throughout the year as it grows well in high salt containing soils with poor quality irrigation water. This crop also fulfilled the green fodder requirement of animals and gave about 115 tonnes/ha yield.

**Conservation of green fodder and sugarcane tops by silage making:**

In view of water scarcity and drought like situation leading to unavailability of green fodder in summer season, intervention of silage making was undertaken. The silage prepared in month of December was available to feed the livestock from February to May. To prepare silage, green maize, jowar, sugarcane tops available with the farmers were used. Intervention of silage making ensured availability of 20 kg silage per day per animal which increased the milk production during the fodder scarce months.
KVK Satna, Madhya Pradesh

Dr. R.S. Negi, Programme Coordinator, KVK Satna presented the major achievements of KVK Satna under NICRA project. He gave a brief introduction of the district and the NICRA village and the interventions undertaken. The details of his deliberations are as under:

Satna district falls under Zone VII, Semi arid Lava Plateau and Central Highlands of Agro-ecological sub region. It falls under Kaymore Plateau and Satpura Hills of Agro-climatic Zone of Madhya Pradesh. Total geographical area of the district is 7,42,000 ha and the net sown area in the is 341,257 ha. The district receives 897.9 mm precipitations annually. Irrigation facilities are meager as only 27 per cent of the area is irrigated. Majority of farmers belonged to the marginal and small categories. The major crops grown by the farmers are rice, wheat, chickpea and soybean etc. The productivity of major crops is far below the national averages. The district has very less area under horticultural crops (2.3%) and livestock population (10.4 lakh) faces fodder as well as water shortage during drought years.

Bhargawan village of Majhgawan Taluk was selected as technology demonstration site under NICRA. The village is situated between 24° 55' 0" North Latitude and 80° 48' 0" East Longitude. Total population of the village is 474 with 74 households. Total agricultural land in the village is 151.56 ha and rice, pigeon pea, wheat, chickpea are the major crops. Lift irrigation, open wells, bore well are the major sources of irrigation. Uncertain and erratic rainfall, sudden rise in temperature, occurrence of frost is the major climate challenges in the village.

The details of module wise interventions undertaken in the demonstration site to combat with the problems of climatic variability were as follows.

**Soil and water conservation:** The practices of soil and water conservation were demonstrated in 22 ha area for drought proofing. These are useful in life saving irrigation during dry spell and recharging of wells. The achievements made with respect to soil and water conservation practices include rain water harvesting for recycling and ground water recharge; contour trenching on sloppy lands- (3198); loose boulder check dams – (26); percolation tanks-(02); farm ponds –(01); earthen embankments –(02); and renovation of defunct wells –(04).

**Resource conservation:** In-situ moisture conservation through better agronomic practices was demonstrated. Ridge and furrow sowing techniques were adopted in 12.2 ha area by 31 farmers in redgram, blackgram, greengram and soybean crops. These demonstrations resulted in 22.11, 28.00, 39.49 and 27.40 per cent increase in the yield of these crops, respectively.
Summer ploughing through reversible plough was done in 47.4 ha of area that significantly increased the rice yields. In wheat, dry seeding and irrigation through sprinkler irrigation was demonstrated in 6 ha of area. The yield advantage of 16.48 per cent was obtained with the sprinkler irrigation over the flood method.

**Crop diversification:** Rice – wheat crop rotation is the main cropping sequence in the area and has longer duration and more water requirement. The interventions of inclusion of short duration pulse, oilseed and vegetables in crop sequence were demonstrated in 67.8 ha area which were found to be more profitable than rice –wheat cropping sequence. The demonstration on substitution of short duration (drought tolerant and frost escaping varieties) during kharif (77.3 ha) and rabi (110.3 ha) seasons were conducted. This has resulted in significant increase in area and productivity of these crops. In addition, intercropping in crops like gram, jowar and wheat with mustard and pigeonpea resulted in higher yields and better utilization of resources.
Percent increase in productivity of different crops

Increase in income in different intercropped crops

**Advancement of sowing time of rabi crops**: To cope with problem of rising temperature in February/March and to minimize crop loss due to terminal heat stress, adjustment in the sowing time was done in case of mustard, wheat and chickpea which has shown good results.

**Soil fertility management**: Demonstration on production of organic manure to improve the soil health and increase water holding capacity was undertaken and 35 NADEP structure were constructed through agriculture department.
Livestock management: For up-gradation of low productive animals, interventions on introduction of improved bull and buck along with AI were undertaken. Three vaccination and animal health camp were organized in the NICRA village which significantly reduced the per cent mortality among the animals. Plants of different species viz. kachnar, moringa, baheda and bamboo were planted in order to make use of waste land, undulated and community lands for fodder production.
For capacity development, 17 trainings, 02 farmer’s workshops, 03 exposure visits and 11 krishak goshthies were organized in the NICRA village. These interventions resulted in increase in cultivated area by 22.4 ha; irrigated area by 51.08 ha; and water level in wells by 2.93 m.

**Some of the lessons learnt under INCRA project interventions were:**

- Farmers’ perspective and perception about the climate change should be considered in planning and implementation stages.
- Host Institute’s support in effective implementation of project is of utmost importance particularly in respect of freedom to organize/conduct interventions; utilization of funds; and encouragement to staff.
- The model of Samaj Shilpi Dampati is the catalyst of change, winning people’s faith and confidence.

**KVK Datia, Madya Pradesh**

Dr. R.K.S. Tomar, Programme Coordinator, KVK, Datia, presented initial outcomes of technology demonstration components of NICRA implemented in Datia district of Bundelkhand Agro Climatic Zone of M.P. He highlighted the climatic challenges in district and interventions undertaken under different modules in the village. The brief account of activities under different modules presented is as under:

**National resource management:**

- Demonstrations conducted on rain water harvesting for supplemental irrigation and ground water recharge.
- Five poly check dams were constructed on Sukha Nala and two old water harvesting structure were renovated, which ensured life saving irrigation for soybean and
groundnut, pre irrigation in 85 ha area, recharge of open wells and extended water availability up to end of March.

- Fish culture was introduced in rain water harvesting structure which increased farmers income.
- In-situ moisture conversation technologies like summer deep ploughing in soybean and sowing across slope in groundnut were also demonstrated.
- Water saving technology like sprinkler irrigation was demonstrated in 45 ha for wheat, mustard and chickpea.
- Soil test based nutrient application not only ensured better yields but also saved time and resources.
- Augmenting organic manure production through on farm production of vermi compost.

**Crop production:**

- Short duration variety of soybean JS-95-60 produced 59% higher yield than farmer’s practice and matured 27 days early than JS-335, which escaped early withdrawal of monsoon.
- Sesame variety JTS-8 gave 39% higher yield and matured 26 days early than local variety.
- Groundnut variety JGN-3 produced 46% higher yield and matured 16 days early than local variety.
- Pusa Jai Kisan variety of mustard suitable under limited irrigation condition gave 30% higher yield over farmer’s practice.
- High temperature tolerant variety of chickpea JG-11 yielded 24% higher over local variety. Variety JG-130 of chickpea suitable for rainfed conditions gave 32% higher yield.
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Sesame JTS-8

Mustard Pusa Jai Kisan

Chickpea JG-11

Chickpea JG-130

Chilli Kashi Anmol

Okra VRO-6
Livestock production management:

- About 100 scrub bulls were castrated to check natural breeding and bull of Murrah breed of buffalo introduced to upgrade non-descriptive buffalo breed.
- De-worming was done in 800 animals (buffalo, goat, cattle & sheep) to reduce the mortality of calves.
- Vaccination was done for FMD and HS in animals for increasing immunity against different diseases under stress condition.
- De-worming with piperazine reduced mortality in buffalo calves.
- Mineral mixture supplementation (mineral mixture 30 g/day/animal) increased the milk yields.

Institutional interventions:

- Village climate risk management committee (VCRMC) has been constituted and account of VCRMC has been opened in Punjab National Bank.
- Custom hiring centre has been set up in village and there are 16 implements being used by 520 farmers covering 355 ha land.
• Scientists from ICAR, officials from RVSKVV and district officers had visited the NICRA village.
• Two farmers belongs to NICRA villages were honored by IARI, New Delhi and RVSKVV, Gwalior for their innovative activities under NICRA project.

Visit of dignitaries to NICRA village

**KVK, Gumla, Jharkhand**

Dr. Sanjay, Programme Coordinator, KVK Gumla, presented the salient achievements of the NICRA project. He informed that drought and cold weather are the major problems for the farmers in Gumla district. The number of rainy days had reduced and the number of dry spells has increased. The project is being implemented at village Gunia (cluster villages Belagara, Burhu and Jargatoli, Kohipath) located at $23^0 162^\prime 86^\prime\prime$ E latitude and $84.582^\prime 02^\prime\prime$ N longitude with a population of 2025 (320 households) and cultivated area of 523.23 ha. The major crops in the study area include paddy, maize, wheat, black gram, ground nut and niger and the major sources of irrigation are river, well, pond, micro lift etc. Drought, intermittent drought, erratic rain fall, heat wave, hailing, cold wave are the major climate challenges in the area. The major focus under the project was on sand bunding technologies for water conservation, development of rain water harvesting structures and crop diversification with high yielding varieties of blackgram, redgram, maize, ragi etc. The existing ponds were cleaned and renovated to enhance water storage capacity, minimize the evaporation losses and making a better micro climate for fish farming; This, not only enhanced the water storage capacity by 30 percent, but also decreased the fish mortality and made available additional water for irrigation. To prevent seepage losses, two
existing ponds were renovated, which not only reduced seepage losses but also increased water storage and ensured irrigation especially during rabi and summer seasons.

Besides, microlifts were installed, which led to switching over of farmers from monocropping to double/multiple cropping. Apart, 25 acre area converted into cultivable land during rabi and summer season with assured irrigation. The practice of “Bora bandi” to channelize the river water for optimum use of available water, soil conservation and sand bunding to prevent paddy crop from water stress were the other natural resource management activities undertaken. Bora bandi resulted in water table enhancement by 44%, area expansion under off season vegetable, summer paddy and wheat cultivation.

Activities undertaken in NICRA village

Under crop production and diversification the emphasis was on summer vegetable cultivation and spring plantation of sugarcane part from maize sowing through multi crop planter.

Crop production activities under NICRA project
A life saving reservoir model developed and demonstrated in the area proved cost effective especially for orchard to provide life saving irrigation in hot summers.

Under crop production drought tolerant varieties of groundnut (ICGV 350), Niger (Birsaniger 1&3), black gram (Uttra), red gram (PGR 158), kulthi (Birsakulthi 1), sweet potato (Birsasakarkand-1), ragi (GPU 28) and maize (Jaunpuri makka) were demonstrated and promoted in the region which not only saved water but also resulted in higher yields. Besides, community and protected nursery as part of cropping strategy was emphasized upon to mitigate the ill effects of erratic rainfall and proper earthing up was adopted to prevent the lodging in sugarcane due to high speed wind. Participatory seed production of paddy variety Lalat resulted in production of 201 q seed in 8 ha.

Under livestock component, introduction of climate resilient improved breeds of poultry was the major initiative towards livelihood security of the poor. Vanraja & Grampriya, the multi coloured (like indigenous) breeds with high disease tolerance and lower mortality rates (less than 4%), whereas, Khakhi Campbells duck performed better in adverse climatic situations than other. Black coloured T&D breed of pig with skin disease tolerance also performed better in the project village.
To cope up the epidemic disease in cattle, rapid action, sensitization of concerned line department, mass awareness, mass immunization, and sample collection for pathological examination was done. The probable cause of disease was traced as anti nutritional factor of Mahuwa i.e. Mowrin and the treatment recommendation resulted in 100% control of epidemic. Fish rot caused due to low pH, muddy pond, cloudy weather and skin cracking resulting in 40 percent economic losses was taken care by lime and potassium permanganate applications.

Major lessons learnt

- Participatory planning, centralized and concentrated nature of work resulted in confidence building among project staff and participating farmers and also raised farmers expectations.
- Simple “Bora-Bandi” innovative idea changed the lives of villagers. It was a miracle for water scarce areas.
- Majority of the farmers have appreciated the utility of various climate resilient technologies.
- NRM component is the most important for sustainable adoption and it must be implemented through village samitee.
KVK Nimpith, West Bengal

Presenting the highlights of achievements made under NICRA project in Nimpith area of West Bengal, Dr. Nilendujyoti, Programme Coordinator of the KVK informed that the district has significant area under brackish water and hence, inundation and water logging are the major problems for the farmers. The average rainfall is 1721 mm spread over 60 days and the region is often prone to cyclonic storms. The KVK under Ramkrishna Ashram is implementing this project in the cyclone and flood prone areas of South 24 Parganas district of West Bengal. The target village is Bongheri (Panchayat: Gopalganj, Block: Kultoli) and the population of the village is 1702 (350 households, 110 beneficiaries) with total cultivated area of 35.8 ha.

Sustainable livelihood in relation to climate change is an emerging issue in the project area. Major cyclones hit the area quite frequently and erratic rain in dry season and frequent inundation in wet season rendered agriculture fall below to its subsistence support to livelihood. The fresh memory of AILA (in 2009) exposed the vulnerability of monoculture towards coping with gradual climate change. Hence, a need was felt towards diversifying the livelihood support system as well as conservation and management of natural resources. Some of the major problems of the project area include shortfall of fresh irrigation water due to declining trend and erratic nature of rainfall; inundated low land situation; soil salinity and poor drainage; and degradation of embankment and embankment plantation (mangrove).

Considering the above climate change driven food security threats, the following climate resilient interventions were taken up under the NICRA project

Natural resource management:

Different activities were taken up to assure fresh irrigation water throughout the crop growing season for efficient and effective land utilization.

Landscaping and rainwater harvesting structure: Through this intervention, low lying mono-cropped fields were converted into multiple cropping ones, in which 1/5th portion of a low land is excavated upto a depth of 9 feet. The dug up soil is spread over the adjacent land so that it is elevated upto 1 to 1.5 feet high. HYV paddy is then cultivated during kharif and different types of vegetables are grown during rabi season on the same elevated land. The excavated pond becomes a source for harvesting of fresh rain water in which fish culture can be taken up. The fresh water from the pond acts as a source for irrigation which makes vegetable cultivation possible on the main land, land embankment and also on pond embankment during the winter months. Through this intervention, rainwater was harvested in 2.6 ha land; cropping intensity increased from 100% to 220%; income increased from Rs. 15300/- to Rs. 134800/- per ha; and soil salinity reduced from 3.5 dS/m to 0.35-1.17 dS/m. Rainwater harvesting indirectly reduced usage of
non-renewable energy sources, like the diesel. This helped to save 2200 l of diesel consumption per year over the 2.6 ha treated land and in turn restricted 1610 kg of carbon emission.

**Land embankment cultivation:** The construction of embankment 4-5 feet high with a width of 3-4 feet around a unit area of low lying paddy field was used for year round vegetable cultivation. This has resulted in additional income and pisciculture opportunity.

**Re-excavation of canal inundated with brackish water from nearby river following “Aila”:** A canal passing through the project village was severely inundated with brackish water during “Aila” and silted up. The 4 km length canal was de-silted and renovated by the villagers. During rainy season, approximately 3600 acre-inch of rain water was harvested and effectively used for irrigation. As many as 500 farm families were benefited through additional coverage of 100 acre under sunflower, 50 acre under chilli and 50 acre under other vegetables. Around 9000 person-days worth earthwork and 6000 person-days worth farm-labour work was generated through this intervention.

**Renovation of defunct water bodies:** A good number of ponds in the village were silted up and were with defunct inlet, outlet and improper embankment. The ponds, covering 2.6 ha were de-silted and renovated which helped to harvest additional 351 acre-inch rainwater to ensure fishery throughout the year as well as life saving irrigation to second crop during winter.

**Ridge and furrow cultivation:** Farmers with small land holdings increased the profit from multipurpose utilization of the land with this system as during monsoon season the furrow is used for fish cultivation while the ridge is used for vegetable cultivation. Earlier the land was used only for traditional paddy cultivation.

**Nursery of mangrove (Sundari):** The project village is prone to inundation with brackish water from the adjacent Matla river during frequent cyclonic storms which breaches the river embankment. The sundari (Heritiera foames) seeds collected from the river by the villagers themselves were grown in nurseries for transplanting along the river embankment. The sundari plantation will in the near future act as buffer against storm and cyclone.

**Crop production enhancement:**

**Deep water paddy:** The intervention was taken up to assist maintaining production in case of water logging following heavy rain. IET-11904, IET-15848, Dinesh, Amalmona, Sabita and Swarna Sub-1 varieties were supplied to paddy farmers for cultivation in lowlands. Inspite of water logging during the month of August, the average productivity was 28.50 q/ha compared to 23.8 q/ha from local variety (Morishal).

**Salt tolerant paddy:** Salt tolerant varieties, SR-26B and Jarava resulted in average production of 33.75 quintal compared to 22 q/ha in case of local variety Dudheswar.
Introduction of sunflower, sweet potato and moong: Salt tolerant crops like sunflower (KBSH-44), sweet potato (Sree Vardhini) and moong (PDM-84-139) have been introduced in NICRA village and their productivity were recorded as 13.42, 162.5 and 6.80 q/ha, respectively. Besides, low water demanding and salt tolerant crop like cotton, including its marketing linkage with CCI, was also introduced in the project village.

Livestock development:

Animal health and vaccination camp: To provide good health management of animal resource, animal health camps were organized and effective parasitic control programme were taken up for immunization of animals against Haemorragic septicemia, Black quarter and Foot and Mouth disease in cattle.

Supplementation of specific mineral mixture: Based on the soil, plant and animal serum analysis, a balanced supplementation of iron, zinc, cobalt, copper, calcium, etc were recommended.

Introducing dual purpose poultry bird: Dual purpose poultry bird (naked neck “Nirbheek” variety) has been promoted as these are tolerant to adverse conditions and resistant to disease.

Institutional interventions:

Established a custom hiring centre and VLRMC for carrying out various agricultural operations in time.

KVK Dhubri, Assam

Dr. Chinmoy Kumar Sarma, Programme Coordinator, KVK Dhubri, presented the salient achievements on “Enhancing resilience of agriculture in the NICRA village of Dhubri to mitigate flood”. He informed that Dhubri district is receiving an average rainfall of 2500-3500 mm per annum and in general, considered as region with excess water. The project is being implemented at Udmari Part IV & V village under Bilasipara sub division of Dhubri district of Assam. Flood is the major contingency of the selected village and interventions were made to mitigate the effect of flood under four different modules. The salient deliberations made are as under:

Natural resource management:

Under this module important interventions were moisture conservation in potato and colocasia by mulching which increased crop yield by 30 & 22 percent, respectively. Removal of excess water by renovation of existing drainage channel was also an important intervention. Soil health improvement work has also been done through green manuring, vermi-composting etc.

KVK promoted high yielding paddy varieties suitable for inundated and flood prone situations and advancement of sowing of common Joy Moti variety which is a non lodging
type. Technologies like integrated pest management, SRI, restocking of fish ponds, lining of fish pond to increase the pH, establishment of community nursery for various crops were also promoted in the NICRA villages.
Crop production module:

Rice is the most important crop in NICRA village and the flood is the major production constraints which affects crop productivity. Flood water damages kharif rice during July - August and sometimes does not allow farmers to transplant rice seedlings in time, resulting in very low yield. Double transplanting with traditional/improved varieties, adoption of traditional late Sali varieties like Panisali, Goyaswari, Malchira etc. and delayed sowing/transplanting with traditional late Sali varieties are some of coping strategies adopted by farmers under adverse situations. KVK intervened by demonstrating some location specific rice varieties suitable for flood affected situations.
As the selected village is a chronically flood affected area, submergence tolerant rice varieties such as ‘Jalashree’ and ‘Jalkuwari’ which tolerate 12-15 days water submergence were introduced. KVK Dhubri also introduced short duration photo insensitive rice variety ‘Luit’ during post flood and staggered planting rice variety ‘Gitesh’, which resulted in higher yields. Establishment of community rice nursery in flood free area enabled farmers to meet their seedling requirement. Introduction of HYVs under NICRA resulted in significant yield improvement in summer rice (21%) and toria (62%) over the existing varieties.

With the sharp rise in fuel price, irrigated rice cultivation has become less remunerative and System of Rice Intensification (SRI) is attracting the greatest attention to address the issue of ‘more yield with less water’. Also, SRI principles encourage approaches which might help to mitigate climatic vulnerability in a more sustainable and holistic way if applied in a meaningful way. Considering its importance in the present day context of climate change, SRI technology was demonstrated during summer season, 2012 (var- Joymoti) in the farmer’s field. The crop was transplanted with very young single seedlings/hill (15 - 18 days old) with wider spacing (25 cm x 25 cm) and maintaining mostly aerobic soil conditions.
up to panicle initiation. After observing the growth of the crop and owing to less water demand, many farmers have shown their keen interest to adopt this technology.

Livestock and fishery:

Livestock is an important enterprise in the NICRA village; however, this component was not properly taken care of by farmers. Infestation of worm was very high in all the animals. The animals were emaciated, dull, rough hair coat and anaemic. After de-worming twice, there was increase in feed intake and animals returned to their normal appetite. Introduction of improved breed of goat and poultry in the existing farming systems were important interventions as alternate source of livelihood.

In fishery sector, escape of cultured fish and entry of predatory fish during flood were restricted by placement of nylon net at desired height along the periphery of pond dykes and renovation of dykes. For management of fish pond during post flood condition, some interventions such as liming in fish pond, de-weeding and application of potassium permanganate as disinfectant were also made which helped in maintaining water quality and improved productivity. Similarly, restocking in some selected fish pond helped to compensate the loss of fishes during flood. Introduction of improved breed of poultry and goat in the existing farming system was also taken-up as an alternate livelihood support.
Institutional interventions:

Poor access to quality seed of rice and oilseed crop was also a major problem in the NICRA village and therefore, KVK Dhubri initiated seed production programme for production of quality seed of high yielding short duration rice variety ‘Luit’, submergence tolerant rice variety ‘Jalashree’, summer rice variety ‘Joymati’ and toria variety ‘TS 36’ which could meet up the seed requirement. A custom hiring centre has also been established for carrying out various agricultural operations in time.
**Major lessons learnt:**

- Selection of rice varieties should be based on the flood situation.
- Submergence tolerant rice varieties for chronically affected area.
- Short duration photo-insensitive rice varieties for post flood situation.
- Staggered planting rice variety where transplanting is not possible due to aberrant weather condition.
- Prophylaxis of livestock to prevent various diseases in flood affected area.
- Maintenance of water quality of fish pond for higher productivity.
- Loss of fishes during flood can be reduced with proper management practices and restocking.

**KVK Uttara Kashi, Uttrakhand**

Dr. V. K. Sachan, Programme Coordinator, KVK Uttrakashi made a presentation on “Management of drought prone area with integrated inventions” highlighting the achievements made under NICRA project. He stated that district Uttrakashi is located in hilly terrain facing typical problems of undertaking crop production in high ranges. NICRA project is in operation in Dunda village, which is located in 30° 41’ 40” N latitude and 78° 20’ 3” E longitude. Canal is the major source of irrigation while wheat, small millets, lentil, pears, horsegram, paddy are the major crops grown. The total cultivated area in the village is 169.85 ha.

Considering the lack of irrigation facilities and uneven rainfall in the area, the KVK mainly intervened by promoting water harvesting by establishment of silpaulin based LDPE water storage tanks. Harvesting surface runoff and perennial hill streams in poly-tanks and cultivation of off-season vegetables utilizing the harvested water have helped in transforming the economy of Dunda village. In the village, a total 10 multi layered cross linked tanks were developed with a total capacity of about 120 m³ which witnessed a significant increase in area under off season vegetables.

The drought tolerant pigeon pea variety VL Arhar -1 gave much higher yield (12.50 q/ha) as compared to local cultivar Tor (8.75 q/ha). Introduction of HYV of wheat (VL Gehu 829) and lentil (VL Masoor 103) was also undertaken which resulted in 36.27 and
61.85 percent yield increase. *Scarabaeids* management through VL Kurmula Trap-1 & Entomo-pathogen WGPSB-2 was also demonstrated in the village. Plantation of subtropical fruit crops like lime, lemon, pomegranate, guava etc. which survive in dry condition and required less irrigation were promoted for additional income generation. Community lands for fodder production to increase fodder availability during droughts /floods was also taken care. Root slips of perennial fodder crops (Hybrid napier) were also provided for cultivation in waste land. Dual purpose kroiler birds, considering their appearance like indigenous breed, multiple color and social acceptability were introduced for backyard poultry. KVK supplied kroiler chicks with some amount of starter feed under the project. The farmers are now rearing poultry birds successfully and earning supplementary income.
Custom hiring center and village climate risk management committee (VCRMC) has been constituted, with 17 members and has started functioning.

**Major lessons learnt:**

- Drought tolerant pigeon pea variety (VL Arhar - 1) has increased the farmer’s income.
- Construction of low cost water harvesting structures (LDPE tanks) has provided opportunity to grow off season vegetables.
- Backyard poultry production in drought area has proved good alternative source of income.

**KVK Kullu, Himachal Pradesh**

Dr. Vinod Sharma, Programme Coordinator, KVK, Kullu presented the salient achievements of the technologies demonstrated under the NICRA project in district Kullu of Himachal Pradesh. Kullu district of Himachal Pradesh is known for apple production and recently the vegetable crops have gained popularity. But, there are some parts of the district which are rainfed and are being affected by the drought. In the selected village Chhoel-Gadauri, drought is the major climatic constraint which can be tackled by introducing drought resistant varieties of wheat, pulses and composite varieties of maize for delayed sowing. The drought can be tackled to some extent by constructing rainwater harvesting structures for providing life saving irrigation through micro irrigation systems. Since, the area is suitable for off season vegetable production, so the aim was also to motivate the farmers for adoption of off-season vegetable production in coming years. The NICRA village has 286 households, of which 66 percent are marginal farmers having an area of less than 0.3 ha, whereas 20 percent of the farmers are small with a land area of about 1.4 ha. The interventions undertaken by the KVK include skill development programmes, farm mechanization, water management and balanced use of fertilizers. As part of project activities, the KVK has also introduced drought tolerant varieties in maize, legumes, okra, plum,
pomegranate. The cropping systems such as maize+ blackgram, maize+ soybean and high yielding varieties of cabbage, cauliflower were also demonstrated. In case of animal husbandry, the KVK intervened through encouraging fodder production among the farmers and up-scaling of promotion of backyard poultry.

Some of the key intervention in the NICRA village included rain water harvesting structure, protected cultivation, disease tolerant varieties, in-situ moisture conservation, drought tolerant varieties, cultivation of deep rooted crops (legumes), intercropping of maize with legumes, diversification through horticultural crops, soil organic matter enhancement activities, MIS (sprinkler & drip), secondary household sources of income to landless farmers through backyard poultry, nutritional enrichment of straw, area specific mineral mixture, plantation of fodder trees/ grasses, azolla for partial replacement of feed concentrate.

A number of training and awareness programmes were also organized in NICRA village on rain water harvesting and water saving irrigation systems like drip and sprinkler irrigation methods. These resulted in the change of cropping pattern as the area under vegetable crops like tomato, pea and cabbage has increased significantly, replacing area under maize.
Technical Session – 7

Activities undertaken in NICRA village

Integration of Best Practices and Technologies under NICRA Project
A field day on the scientific cultivation of *rabi* crops was organized at village Chhoel on 13\textsuperscript{th} November, 2011. The programme was attended by more than 500 farmers along with extension personnel’s from district administration as well as line departments. Hon’ble Deputy Director General (Agricultural Extension) Dr. K.D. Kokate was chief Guest of the
function and Zonal Project Director Zone-I, Dr. A.M. Narula presided over the function. The exhibition depicting the various activities of university and Krishi Vigyan Kendra was also put up. On the spot solution to the various farmers’ problems was provided by scientist of the university and KVK.

**KVK Bharatpur, Rajasthan**

During the presentation, it was informed that KVK Bharatpur has implemented the NICRA project in Sitara village. The village has 235 households with 375 ha cropped area. The village is situated between 26°22’ and 27°83’ N latitude and 76°53’ and 78°17’ E longitude. Paddy in kharif, wheat and mustard in rabi are the major crops cultivated in the village. Tube wells are the major source of irrigation in the village. The salient achievements of the KVK include establishment of rain water harvesting units, recharging of tube wells, promotion of technologies related to integrated nutrient management, orchard promotion, and improvement of livestock breeds. Climate variability challenges identified in the village were unpredictable rain resulting in water scarcity, saline water below 25 feet and over exploited ground water and frequent draught and salinity and prolonged dry spells. Consequently the activities under NICRA project undertaken in the village were as under:

**Natural resource management:** The activities undertaken in the NICRA village include tube well recharging; roof water harvesting structures; deep ploughing, bunding & leveling; green manuring of dhaincha; use of gypsum as soil amendment; and promotion of vermi & NADEP compost.

Crop Production interventions include drought and salinity resistance crops and variety; integrated nutrient management; use of growth regulators and micro nutrients; intercropping and mixed cropping; high tech vegetable production in net houses; orchard development with fruit species like aonla, ber , guava and papaya; and tree plantation.

Live stock interventions taken up by KVK include mitigation of vitamin and mineral deficiency in live stock; introducing better adapted high yielding breeds of buffalo Murrah and goats Jamunapari to combat the problem of inbreeding in animals; animal health camps; demonstration on fodder production; and improved feeding practices like manger.

The major Institutional interventions facilitated under the project include establishment of custom hiring centre, seed bank and introduction of group marketing. In order to increase the participation of farm women, some other activities were also undertaken in the
village to faster inclusive growth and make them aware on various issues of women empowerment, child health & nutrition and importance of nutrition garden for improved food and nutrition of the whole family.
Impact of interventions:

- Water table has risen significantly by about 8 to 10 feet in the project village.
- The stored water is used for irrigation purpose during dry spell as protective irrigation.
- Due to recharge of tube wells and availability of water farmers have started cultivating wheat, barley and vegetables in addition to mustard.
- Runoff water continuously delivered in tube wells, helped farmers to pre-irrigate the field for sowing the rabi crops when September rains are not received. Soil salinity problem also decreased due to good quality irrigation water.
- Deep ploughing, bunding & leveling minimized runoff water and helped in-situ moisture conservation.
- Soil amendment using gypsum improved soil health and enhanced the production as well as oil content in mustard, while green manuring improved the soil fertility.
• Roof water harvesting ensured non contaminated drinking water to the villagers and their animals.
• Vermi bed & NADEP compost pits helped to augment the soil organic contents and enhanced the production and quality of vegetables.
• Use of growth regulators and micronutrients protected the crop from high temperature and water stress conditions.
• Integrated nutrient management with emphasis on bio-fertilizers viz., Trichoderma, Azatobacter, Rizobium and PSB culture not only minimized environmental pollution but also managed the diseases effectively.
• Introduction of better adapted high yielding breeds of livestock buffaloes male (Murrah) and Jamunapari buck resulted in higher milk and meat yields.

Major lessons learnt:

• More time is required for adoption of resource conservation practices, moisture conservation, varietal replacement and crop diversification with higher yield potential under water stress conditions.
• People participation is required for better dissemination of the technologies among the community and synergy of different projects with NICRA like projects is very much essential for better results.
• Focus be given to promote the custom hiring centers on large scale and other related inputs should also be provided on payment basis.

After the completion of presentations from the KVKs, panelists expressed their opinion and the brief content of deliberations is hereunder:

Dr. A.M. Narula, Zonal Project Director Zone I opined that NICRA need to be expanded during the XII Plan with a minimum of additional 25 districts for each Zone. He said that as recruitment of Research Associate in the project is difficult in some cases, B.Sc (Agriculture) graduates may be considered for serving in the project and expressed the need for convergence of NICRA with other State/Central Government schemes.

Dr. A.K. Singh, Zonal Project Director Zone II expressed that custom hiring centers are functioning exceptionally well and they need to be encouraged with more number of farm machineries and equipments. He also felt that more number of KVKs need to be included in NICRA project. He suggested that lac cultivation may also be considered under the project.

Dr. A.K. Gogoi, Zonal Project Director, Zone III expressed the need for evaluation of NICRA project at every stage and up-scaling of outcome on a larger scale. He also desired that technologies proved successful should be promoted/ scaled up on similar situations and more number of interventions needed in livestock, fisheries and agro-forestry sectors.
Dr. N. Sudhakar, Zonal Project Director, Zone V opined that capacity building by CRIDA to the NICRA staff should be a regular affair and under normal conditions, the weightage of interventions may be given in the order of crop production, natural resource management, animal husbandry and institutional interventions.

Dr. Y. V. Singh, Zonal Project Director, Zone VI also desired that NICRA project be expanded to other districts and more number of villages should be covered under each KVK. He said that technological interventions implemented under NICRA scheme need to be integrated and operated with other state and central government schemes.

Dr. Anupam Mishra, Zonal Project Director, Zone VII told that NICRA project being operated by the KVKs of Zone VII has promoted various technologies in livestock production and management, sowing methods, heat tolerant wheat varieties, flood tolerant paddy varieties etc. He also suggested that there are about 4860 ITKs, which may also be effectively blended with the technological interventions and taken up under NICRA project by the KVKs.

**Recommendations**

The Chairman moderated the discussions among the delegates on the presentations and based on these discussions the following action points/recommendations emerged:

- NICRA project need to be expanded to other districts in all Zones, preferably 25 additional districts in each Zone.
- Technological interventions being undertaken under NICRA need to be converged with other Government schemes such as RKVY, MGNREGA, etc.
- Cost effective technologies such as zero tillage, water harvesting and conservation methods, custom hiring of implements and many more need to be up-scaled under NICRA.
- Increased degree of cross learning is required among the KVKs operating NICRA project.
- The scientific issues of technological interventions, success stories, constraints and bottlenecks faced during the implementation period need to be documented for ready reference by the stakeholders.
- Response of technologies under varied conditions of biotic and abiotic stress need to be assessed before taking up under demonstrations.
Technological Backstopping and Harnessing Synergy of Working in Partnership Mode

Chairman: Dr. K.R. Dhiman, Vice Chancellor, YSPUH&F, Solan
Co-Chairman: Dr. V.V. Sadamate, Principal Consultant, FAO India Office, New Delhi
Panelists:
- Dr. N. Nadaraja, Director, IIPR, Kanpur
- Dr. A. K. Singh, ZPD, Zone IV
- Dr. R. Prashad, Advisor (R&D), Dhanuka Agritech Ltd., New Delhi
Rapporteurs:
- Dr. S.K. Roy, Senior Scientist, ZPD, Zone-II, Kolkata
- Dr. Keshava, Senior Scientist, ZPD, Zone-I, Ludhiana

Presentations:
1. Transforming Farming into Agro-entrepreneurship:- A Case of Banana Tissue Culture
   Dr. Sanket Thakur, B-32, Shriram Vihar, Purena, Raipur
2. Experiences of Working in Partnership for Crop Management
   Dr. R. Parshad, Advisor (R&D), Dhanuka Agritech Ltd., New Delhi
3. Technological Backstopping of KVKs for Harnessing Pulse Productivity-Experiences of IIPR
   Dr. N. Nadarajan, Director, IIPR, Kanpur
4. Technological Backstopping of KVKs-Experiences from Andhra Pradesh
   Dr. Gidda Reddy, DEE, ANGRAU, Rajendranagar, Hyderabad
5. Technological Backstopping of KVKs-Experiences from Rajasthan
   Dr. Inderjeet Mathur, DEE, MPUA&T, Udaipur
6. Technological Backstopping of KVKs-Experiences from Jharkhand
   Dr. R.P.S. Ratan, DEE, BAU, Ranchi
7. Backstopping of KVKs for Technology Management, Business Planning & Development-Experiences of ICAR
   Dr. C.N. Ravishankar, ZTM & BPD unit, CIFT, Cochin
8. **Scientifically Integrated Herbal Solutions for Enhanced Livestock Health Index and Profit of Farmers – Experiences of Ayurve**  
   Dr. Anup Kalra, CEO, Ayurveda Limited

9. **PPP Experiences of United Phosphates Ltd.**  
   Dr. Vinayak Sharma, Integrated Business, UPL

10. **Mahindra Kisan Samridhi Programmes and Approaches**  
    Shri Harshvardhan Nawathe, Mahindra & Mahindra Ltd

11. **“Sunhera Kal” - A KVK-JCB Unique Collaboration Bringing Progressive Difference in Rural India**  
    Shri Puneet Vidyarthi, GM & Head, Rural JCB India Ltd., Ballabgarh

12. **Innovation: An integrated approach by Falcon Garden Tools Limited**  
    Miss Rasleen Duo, Falcon Garden Tools Limited
THE session on “Technological Backstopping and Harnessing Synergy of Working in Partnership Mode” was conceptualized to lay emphasis on reforms required for harnessing synergies of public-private partnership for the benefit of farming community and faster dissemination of technologies. This important session, in present day context, was chaired by Dr. K. R. Dhiman, Vice Chancellor, TSPUH&F, Solan. The chairman briefed the house about this important session and asked for innovative suggestions and action points from the presenters as well as audience. In this session, 12 presentations were made, the details on deliberations are as under:

Transforming Farming into Agro-entrepreneurship: A Case of Banana Tissue Culture: Dr. Sanket Thakur, CMD, Agricon Agro Producer Company Ltd. Raipur

Dr. Sanket Thakur briefed the house about Agricon Company and various activities being undertaken by the company in public-private partnership mode. He informed the house that, after almost a decade of working in the field of agriculture through NGO as para-professionals, a group of well qualified agritech professionals promoted a company with farmers as shareholders in the name of Chhattisgarh Agricon Private Limited (CAPL) in the year 2005 at Raipur. The main aim of the company was to develop entrepreneurial skill among farmers and income generating opportunities at village level through integration of natural resources and technologies. He informed that CAPL is the first primary producer company of farmers in Chhattisgarh. It works on various aspects of agriculture and allied fields to achieve its aim of providing maximum benefit to farmers for sustainable livelihood through agro-entrepreneurship. Main activities of Agricon includes transfer of technology; providing suitable farm inputs at concessional rates; financial assistance from banks; government or private institutions; post harvest processing; and finally the direct marketing and distribution of farm produce through retail chain, home delivery and shopping malls.

Dr. Sanket told that some of the key products and services of Agricons include ‘Vegefresh’ for home delivery of farm fresh vegetables and marketing of produce; aromatic oil extraction and sale; Aditya Biotech Agricon Research & Development Lab to produce and market the tissue cultured plants of Banana, sugarcane and bamboo; small & medium nurseries for supply of quality planting material of fruits, vegetables, forestry, medicinal and aromatic crops; seed production to establish seed village bank in every village; dairy units; agribusiness centres in different locations; marketing and distribution of bio-fertilizers and bio-pesticides; fish and agriculture farms for demonstrating advanced farming systems/technologies; cultivation and promotion of cow-based organic farming etc. He further informed that share holders of Agricon are mainly small and marginal farmers.
and majority of them belong to tribal and OBC community of Chhattisgarh and the profits of the company are shared among shareholder as patronage bonus and dividends after assessment of net profit.
Experiences of Working in Partnership for Crop Management: Dr. R. Parshad, Advisor (R&D), Dhanuka Agritech Ltd., New Delhi

Dr. R. Prasad, Advisor, R&D Dhanuka Agritech Ltd., discussed about multi agency transfer of technology and their initiatives on aspects of soil testing and transferring locally relevant technology. He mentioned about the problem of partnership development and basis of working in effective manner for transfer of technology. He cited examples of successful collaborative programme on IPM in KVK Chhomu and soil testing facilities created in Alwar district of Rajasthan. He observed that there should be community goals for effective partnership development. He also emphasized for pluralistic extension with mix of public-private, public-public and private-private partnerships, national policy on private-public convergence and related areas. Citing the example of Hoshangabad district of Madhya Pradesh where Dhanuka took the responsibility of agricultural extension management, he urged for such type of initiative in other states also. Examples of convergence like formulating project DAESI in association with MANAGE, mobile soil testing facility in Alwar district of Rajasthan in collaboration with Department of Agriculture were also cited by him along with convergence with ICAR, SAUs and other organizations in organizing seminars and laying out demonstrations. He suggested for creating consortium of agro-industries, strengthening agro-input dealers, interactive visits of farmers, convergence between KVKs and private organizations and development of such successful models for its up-scaling. He opined that linking farmers and establishing demonstration units in enterprise mode will be an important initiative in this direction. Training and exposure visits and network with SAU, ICAR and CSIR Institutions will empower the farmers to a great extent. He dealt with how to draw a specific action plan for convergence of ZPD, KVKs and private companies. The details of his presentation are given below.

Since, the present day agriculture is highly knowledge driven, there is urgent need for continuous technological backstopping along with availability of quality inputs. As the State Extension Services are not in a position to meet the farmers’ demands, the Ministry of Agriculture has been advocating multi-agency dispensation of agricultural extension services, working in a participatory mode: Public-Private and Private-Private, has thus become a buzz word to accelerate transfer of technologies and in turn their high adoption for enhanced income per unit area. Dr. Prasad told that Dhanuka undertakes multiple programmes to enhance farmer/dealer engagement by imparting technical knowledge, product demonstrations and technology transfer. The company regularly conducts various awareness programs for the benefit of farming community, viz. providing direct advice and assistance through a trained team of agricultural experts employed by the company named as ‘Dhanuka Doctors’, giving large number of demonstrations on farmers’ fields, establishment of soil and water testing laboratories for the benefits of farmers, providing seed treatment facilities through seed treatment machines operating in
various parts of the country, organizing ‘Kisan Mela’, workshops and farmers’ meetings to educate the farmers about the safe and judicious use of pesticides and communicate them about the innovations in the field of agriculture. Direct interaction with the farmers facilitates the Company to assess the actual needs and requirements of the farmers. The initiatives undertaken by Dhanuka Agritech in promoting extension programmes under Public-Private Partnership mode are as under:

- Established soil and water testing laboratory in Hoshangabad district through first public-private partnership (PPP) with the Government of Madhya Pradesh to provide soil and water testing facilities for the benefit of farming community.
- Off-campus training of agri-input dealers with Anand Agricultural University and collaborated with MANAGE, Hyderabad for DAESI programme.
- In association with Rajasthan Government, Dhanuka group has started running a mobile soil testing van which provides on the spot test reports and agricultural advisories to the farmers for balanced fertilizer application.
- Demonstrations on IPM, training of dealers & farmers, and publication of literature along with KVK, Chomu (Rajasthan).
- The Company has also partnered with Indian Council of Agriculture Research (ICAR) to support activities for providing better farm inputs and advice to farmers.
- ‘A golden march towards food & nutritional security’ organized jointly with 11 SAUs.
- Started a project on Litchgro (Bihar State Litchi Growers Organization) under private- private partnership mode (Litchi Farmers and Dhanuka Group) during 2006. Government of India, Government of Bihar, ICAR, N.H.B., NABARD, R.A.U. Pusa and APEDA are the project associates.
- Started training and interface meetings under PPP in five states in collaboration with KVKs and Department of Agriculture.

While sharing some experiences of PPPs, Dr. Prasad pointed out that Government departments probably feel like helping a private partner & thus want to show authority rather than facilitating implementation of the work. He further added that instead of flexible rules for the private partner, more stringent guidelines are formed which often make the private partner less interested. In view of this, he gave following suggestions to make PPP more effective:

- To create a Consortium of agri-input houses willing to work in partnership mode.
- Draw specific action plans for convergence at ZPD and at KVK especially in training & skill development of farmers, extension personnel and to bring out success stories.
- Training of agri-input dealers in public-private partnership by SAUs, ICAR Institutes, etc.
Technical Session – 8

Soil testing laboratory

Partnership with MANAGE for DAESI programme

Mobile Van under PPP with the Govt. of Rajasthan

Launching of PPP with KVK, Chomu

Launching of one year certificate course for agri-input dealers by AAU, Anand in partnership with Dhanuka Agritech Ltd.

Joint National seminar by ICAR & Dhanuka Agritech Limited

Technological Backstopping and Harnessing Synergy of Working in Partnership Mode
• Demonstration of quality products of the private sector at KVK demonstration farms.
• Convergence for interactive visits of farmers to see successful experiences.
• Partnership not limited to one-time event but sustainable strategic relationship with clear deliverables and agreed upon targets and results should be created.
• Successful models of public-private convergence may be collated and the processes facilitating need to be brought out and used for up-scaling.
• To create favorable climate, including flexible rules, sharing of rewards, joint monitoring and direct funds flow, etc.

**Technological Backstopping of KVKs for Harnessing Pulse Productivity—Experiences of IIPR: Dr. N. Nadarajan, Director, IIPR, Kanpur**

Dr. N. Nadarajan, Director IIPR, Kanpur, presented in detail, various aspects of technological backstopping to KVKs particularly for harnessing pulse productivity in IIPR. He stated that IIPR Kanpur carried out basic strategic and applied research on major pulse crops since 1983. The Institute develops appropriate production and protection technologies, undertakes production and supply of breeder seeds of improved varieties; demonstrate and transfer of technologies; besides strategic coordination of pulse research through wide network of testing centers across the country.

He informed that 330 varieties of pulses were developed in last 20 years by IIPR along with development of agronomic management and IPM. However, he observed that the productivity of pulses stands at 630 kg/ha, the major constraint being faced in cultivation of pulses is rainfed farming which covers about 80-90% area under pulse production. Giving a detailed account of demonstrations, he mentioned that IIPR planned 6000 demonstration in 137 districts covering 11 states and 5 major pulses for augmenting productivity of the selected pulses with technology module like variety, balanced fertilization and IPM. In the same context he highlighted that three training programmes for each of 137 districts were conducted to take up pulse productivity on a comprehensive mode, the outcome of which could be understood with yield increase of 33 % in chickpea and 30-40 % in summer mungbean in Punjab, AP, UP and Karnataka over locally available technology. In other pulses like pigeonpea, mungbean, urdbean, lentil; the yield increase was also substantial compared to farmers’ practice. A case study presented by him showed that Rs. 60000/ha can be earned in 60 days in summer mungbean in UP. He mentioned that popularization of farmers’ preferred variety was most important factor behind increasing productivity of any crop.

He informed that technology demonstrations for harnessing pulse productivity through KVKs envisage demonstrating production potential of newly developed technologies and varieties of pulses at farmers’ field to bring in enhanced application of
modern technologies to address the issues related to potential of pulses in the country. The technology modules have been prepared by IIPR, Kanpur for each district on aspects like improved variety, seed treatment with fungicides & rhizobium, seed priming, population management (line sowing & raised bed planting), balanced fertilization, herbicide application, life saving irrigation and integrated pest management. Apart IIPR also organized training programme for KVK Scientists to update them about the improved pulse production and protection. He presented in detail, the state-wise coverage of demonstrations under technology demonstrations for harnessing pulses productivity (TDHPP) in various pulse crops viz. pigeonpea, chickpea, urdbean, mungbean, lentil etc. and the performance of these demonstrations.

**Technical Backstopping of KVKs – Experiences from Andhra Pradesh:** Dr. P. Gidda Reddy, Director of Extension, Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad

Dr. P. Gidda Reddy, DEE, ANGRAU, Hyderabad mentioned that the University is emphasizing on need for providing technological backstopping in the areas of cost reduction and climate resilient agriculture. Increasing productivity and net return were main objectives of the technology backstopping to KVKs as Andhra Pradesh tops in fertilizer, pesticide and herbicide usage. He described different technologies introduced by the university like direct seeded rice, aerobic rice, mechanization in SRI rice and direct sowing through broadcasting. Direct seeded rice saves Rs. 8000/ha which has been popularized in 50-60% area of rice production. Phosphorus reduction intervention was also introduced to save 30% P and Rs. 2500-3000/ha. Soil test based fertilizer application introduced among the farmers through KVKs was adopted by 30% farmers, while drought mitigation was introduced through 2% urea spray which was adopted by 80% of the farmers. Other interventions were management of YMV through varietal replacement, zero tillage in maize and sorghum and value chain in multi-grain atta. He also explained the extension innovation developed by the University Flag method, innovative farmers’ network etc. He mentioned that 34 KVKs are working in Andhra Pradesh and ANGRAU, Hyderabad conducted demonstrations on direct sowing with drum seeder in rice, aerobic rice, mechanized SRI in rice, direct sowing through broadcast in 1.0 lakh hectare area in

### Productivity and economics of sowing with drum seeder and conventional rice transplanting

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<tr>
<th>Particulars</th>
<th>Direct seeding</th>
<th>Conventional method</th>
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<td>Grain yield (Kg/ha)</td>
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<td>6188</td>
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<td>Cost of cultivation (Rs)</td>
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<td>37860</td>
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<td>Gross returns (Rs) @ Rs 700 /75kg bag</td>
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<tr>
<td>Net returns (Rs)</td>
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<tr>
<td>B:C Ratio</td>
<td>2.226</td>
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</table>
the state. He added that grain yield of 68.20 q/ha was obtained with direct seeding than 61.88 q/ha in the conventional method. The higher net returns of Rs. 35090 per hectare were obtained observed with B:C ratio of 2.22 over the conventional method of rice transplanting as given in the table.

He mentioned that Phosphorus reduction interventions on paddy, maize and groundnut were standardized and promoted and impact of Phosphorus reduction interventions resulted in saving of 30% Phosphorus fertilizer application with saving of Rs. 2500-3000/ha and the interventions are adopted in 10,000 ha area in each crop. He also presented the following highlights of adoption of various recommended technologies by the farmers of Andhra Pradesh:

- Soil test based fertilizer application adopted in 30 per cent area.
- Drought mitigation measures with 2.0 per cent potassium nitrate/ urea spray adopted by 80 per cent farmers.
- Application of 5.0 per cent salt solution to avoid germination and discoloration of rice during cyclones adopted by 40-50 % farmers.
- Various weed management practices adopted by upto 90 % farmers in 3.0 lakh ha area.
- Management of YMV through varietal replacement with LBG-752 adopted in 2.0 lakh ha area.
• Management of YMV through varietal replacement with PU-31 adopted in 10000 ha area.

• Management of YMV through IPM (seed treatment, removal of weeds, infected plants, control of vector whitefly) adopted in 5.0 lakh ha area.

• Management of Maruca pod borer in pulse crops through use of Chlorpyriphos 2.5ml + Dichlorvos 1.0ml / Emanection benzoate @ 0.4g/l/ Rynaxypir @ 0.3g/l/ Flubendamide @ 0.2g/l adopted in 2.0 lakh ha area.

• Stem application in Cotton against sucking pests with Imidachloprid 1:20 or Monocrotophos 1:4 adopted in 40000 ha area.

• Protection of crops from wild boars and birds through reflective ribbon, silver coated paper plates, egg solution and human hairs adopted in 15-20 per cent area.

• Four releases of Trichogramma @ 50000 population / ha at 7- 10 day intervals in Sugarcane and rice against Shoot borer adopted in 5000 ha.

• Application of Trichoderma viride @ 4kg/ha for management of Red rot in sugarcane (seed treatment and Soil application) adopted in 2500 ha.

• Bio-intensive pest management (BIPM) in rice using Pseudomonas, neem oil, Trichogramma and Bt adopted partially in 25000 ha.

• Adoption rate of varieties of rice (MTU-1061, MTU-1001, MTU-1010, NLR-34449 and JGL-11470) was 20 to 70 per cent while maize (DHM-117), groundnut (K-6 & K-9) and blackgram (LBG-752) varieties were adopted by farmers in 5000, 5.0 lakh and 2.0 lakh hectare of area, respectively.

He added that in order to reduce the cost of cultivation, time and drudgery, maize dibbler, rice mechanization, tractor drawn ananta planter, groundnut thresher, aqua seed drill, groundnut decorticator, bullock drawn groundnut planter, chilli drier, mechanized spraying in groundnut etc. farm implements and machinery were popularized.
He further informed that the value addition and entrepreneurship development were emphasized in groups through preparation of multi grain atta and Jowar value chain. The various products like Jowar bold Ravva, Jowar fine Ravva, Jowar flour and Jowar Bran are being prepared. Group members are earning Rs. 63600 net profit from these products. In addition to these enterprises, backyard poultry, vermi-compost, soya foods etc. were given the due importance.

In the end, he emphasized that, to tackle the field problems, Flag method of extension was developed and popularized and master trainers for up-scaling the extension activities in the rural area were identified and trained. Farm science clubs and innovative farmers network for transfer of agricultural technology were also formed.

**Technological Backstopping of KVKs-Experiences from Rajasthan: Dr. Inderjeet Mathur, DEE, MPUA&T, Udaipur**

Director of Extension Education, MPUA&T, Rajasthan, Dr. Mathur in his presentation highlighted salient achievements of KVKs in Rajasthan with special emphasis on farm mechanization. He was of the view that considering KVKs as separate entity by
some universities is unfortunate and advocated for interchange of staff from KVK to University. The details of his deliberations are as under:

Rajasthan is the largest state of India having 10.41 per cent geographical area. Majority (70 %) land area of the state falls under Thar Desert with only 01 per cent of water resources. The state has 33 districts out of which seven districts are tribal. The state is divided into 10 agro climatic zones. The state has great diversity in crops, animals and soil type. In all, 42 KVKs in the state are technological backstopped by Directorates of Extension Education, MPUAT, Udaipur, SKRAU, Bikaner, RAJUVAS, Udaipur and ICAR institutes including CAZRI, Jodhpur, DRMR, Bharatpur and CIAH, Bikaner. These KVKs are playing an important role in technology dissemination, improvement in agriculture and allied sectors.

While mentioning the importance of human resource development, Dr. Mathur deliberated in detail on the various training programmes being run by the universities from time to time for skill up gradation of KVK scientists, programme assistants as per priority areas of state and universities & thrust areas of KVKs. These include resource management, knowledge generation, community awareness & mobilization, personality development & management, project management, value addition and post harvest management of horticultural crops, protected cultivation of horticultural crops, computer aided designing and manufacturing of cloths, technology for quality life of rural families, hi-tech horticulture for quality life of rural family, awareness of agro-engineering technologies suitable for farm families, farm mechanization, animal farm management, Integrated pest/ disease/ weed management, integrated farming system. He informed that KVK scientists are also regularly deputed for training and refresher courses at EEI Anand; MANAGE, Hyderabad; NAARM, Hyderabad, NIAM, Jaipur and SIAM, Jaipur.

He mentioned that, for making technologies suitable to locations, technology assessment and refinement is being done through KVKs. Technologies from the research units of the university, ICAR institutes in the state and other SAU’s are taken for assessment and refinement after thorough discussions/ deliberations in research council of university, departmental meeting, zonal research and extension advisory committee meets, pre-seasonal interface and OFT workshops. While finalizing the OFTs, emphasis is given on major problems highlighted by the farmers and on covering all disciplines viz., crop production, horticulture, animal production, plant protection, soil science, agriculture engineering etc. In order to show the potential of farm technologies to farmers against the local practices, FLDs are being conducted by KVKs with the support of critical inputs. The technological intervention package is decided in the FLD workshops. FLDs programmes are conducted as per annual KVK plan and allocated under ISOPOM (maize), NHM (vegetables & fruits), RKVY (pulses & oilseeds), TSP area programmes of ICAR Institutes and AICRP. For experiential learning, vocational units on mother orchards, model nurseries, polyhouses, *Trichoderma* production, bee keeping, dairying, goat unit, emu
unit, fish unit, medicinal & aromatic plants, PHT unit, disease forecasting unit, weather observatory have been established in different KVKs. The literature like *Rajasthan Kheti Pratap*, *Krishi* calendar, pamphlets, booklets, folders, leaflets, etc. have also been developed and being distributed to the farmers by the KVKs in the state. Exhibition unit, technology park, bio diversity park, single fruit park, farmers library was also established. Apart, technology is also up-scaled through organization of Kisan Melas, use of ICT and collaboration with IKCL.

Dr. Mathur also informed that to review the progress of activities, monitoring of KVKs is being done regularly by organizing EEC and SAC meetings, technology week, monthly review meetings, visit by HVC & Director and visit of DEE scientists and
Dr. Mathur added that 726.7 lakhs grant have been received from different organizations in KVKS. Various adhoc projects like Rashtriya Krishi Vikas Yojana, Khet Talai, Vegetable cultivation on drip, National Horticulture Mission, Food processing labs, National Agricultural Innovation Project, Rajasthan Mission on Skills and Livelihoods, Village Livelihood Development Project, Entrepreneurship trainings, Tribal Area Development, Village development project, DST etc. are being run through KVKs.

He made a mention of various skill up-gradation trainings, other extension activities being conducted by KVKs and seed production programme of the KVKs. Some of the salient achievements of NAIP funded project highlighted by Dr. Mathur include livelihood and nutritional security of more than 12000 tribal families; promotion of vegetable cultivation in 1200 ha (more than 5000 families); formation of 161 (1661 farmers) farmers business groups and three producer companies; seed replacement in 10600 ha; establishment of 136 goat units (2 goats + 2 kids), 2095 units of Backyard Poultry Nirbheek (20 birds per unit), Introduced 288 Sirohi breed bucks; quick connect HDPE Pipe: 3.45 lakh meters (850 ha additional area under cultivation); and generated sustainability fund of Rs. 2.43 crores.

Dr. Mathur also deliberated on some of the lessons learnt during past, which are:

- Horticulture led to substantial economic empowerment, additional employment generation and nutritional security.
• Increased water-use efficiency through irrigation pipes and drip irrigation system led to enhanced production and income.
• Nirbheek Backyard Poultry led to enhanced supplemental income, women empowerment and nutrition of children.
• Sustainability fund led to true partnership of stakeholders and involvement of farmers.
• Development of service provider is also key to continued sustainability of a project.
• Convergence with various agencies and public-private partnership led to faster income enhancement.

In the end Dr. Mathur also apprised that some new initiatives started by the University included sensitization programmes for public representatives; organization of farmers-scientists interaction at each block in the district; demonstrations on high value low volume crops at KVK instructional farm; technology promotion on Peri-urban farming; custom hiring of implements; establishment of bio diversity park at KVKs; promotion of HQPM in tribal dominated districts; establishment of producer companies and farmers business groups; renewable energy resource demonstrations at KVKs viz. Solar water pump, tunnel dryer, solar cooker for animal feed, smokeless chullah; and capacity building of Krishak Mitras.

Technological Backstopping of KVKs – Experiences from Jharkhand: R.P. Singh Ratan, DEE, BAU, Ranchi

Dr. R. P. S. Ratan, DEE, BAU, Ranchi explained the initiatives taken by the University on technological backstopping and technology integration. He mentioned that technological backstopping is a function of empowering KVKs and different models of technological backstopping are being employed for the same. Dr. Ratan mentioned that backstopping of KVKs is the prime need because technology integration requires innovative approaches to be followed by the specialists, keeping farmer’s situation in mind. He added that the tasks are both challenging and self containing/satisfying. It requires sustained backstopping on technological, methodological, managerial, financial and infrastructural developments. He also added that ICAR has brought a sea change in backstopping of the KVKs since 2005 and Directorates of Extension Education of Agricultural Universities are assigned this noble task.

He informed the house that the BAU Ranchi is engaged in intensive backstopping and supervising the activities since 2006 with the objectives to undertake activities for human resource development of the KVK personnel; to facilitate scientists’ visits to KVKs and adopted villages in order to develop competencies of KVK personnel; to empower the KVKs in defining the symptoms of technical problems and working with farmers to resolve the underlying issues; to conduct training and on-the-job backstopping and to
offer technology professionals the knowledge, skills and credential to deploy and maintain their technical competencies. The technological backstopping models being adopted by BAU are:

- Human Resource Development Model
- Workshop-cum-Seminar Model
- Scientists’/Experts’ Visit Model
- Technological Input and Information Support

He mentioned that, under HRD model, topics of training programmes are decided with the participation of KVK functionaries in workshop mode. Training methodology mainly includes participatory/interactive modes like group assignments, group discussions with blending of hands on experiences. He added that training programmes on technological aspects, extension methodology and managerial aspects have been conducted apart from deputing staff for long and short duration advanced training to different organization including SAUs and ICAR Institutes.

He mentioned that monthly review workshops have been conducted regularly under workshop-cum-seminar model. Problem-solving workshops and National/State level seminars/symposia have also been conducted apart from participation in National/International Seminars organized by other institutions.
Visit of university scientists/experts to KVKs either individually or in teams is the main feature of scientists/experts visit model. He added that monitoring teams visit to KVK farms and adopted villages, besides other, arranged visits of experts/dignitaries and development professional’s visits.

The publications like district-wise technology modules for Jharkhand, Birsa Kisan Diary, Pathari Krishi and bulletins on various subjects have been published and are being distributed to KVKs and farmers in the Jharkhand. He also added that IT based technological supports for the benefit of farming community has been started in the state by the university. The major components of IT based support include internet based support; mobile based solution and offline solution like video CDs and LCMS CDs. The critical inputs like seed of recently released varieties, bio-fertilizer, bio-pesticides and improved breeds of livestock and birds have been provided to the farmers through its ATIC centre. The salient outcome and impact of technological backstopping efforts are:

- KVK personnel are now relatively better exposed and competent in recent technological advancements.
- Improved performance in carrying out the mandated activities i.e. OFT, FLD and trainings and other extension programmes.
- Exposure to innovative extension methodologies has resulted in enhanced capacity of Programme Coordinators in planning, implementation and supervision of KVK activities.
- The overall backstopping resulted into improvement in knowledge and enhancement of skill with aptitude to work with the farmers.
- Acquired skill of technology integration with farmers’ management practices.
- Better delivery of technological feedback to the research systems.
- Better understanding of tribal agriculture and skill of motivating tribal farmers,
e.g. KVK Sahibganj’s efforts to convert shifting cultivation into plough agriculture among Paharia tribes.

- End to End approach realized by KVKs Gumla, West Singhbhum and Ranchi in millet, fruit and honey production respectively.

- All the KVKs performed a commendable job in technology backstopping at the district level during the drought years of 2009-10 and 2010-11.

- All the KVKs have developed a good convergence with ATMAs in implementation of extension reforms and flagship schemes.

- The KVKs have been able to disseminate technology, weather and market-related information through SMSs.

- Developed expertise in NRM technologies with special reference to conservation agriculture e.g. KVK, Koderma and Godda.

- Developed expertise in documenting the ITKs/ farmers’ innovations/ better management practices.

- On-campus training programmes for rural youth in KVKs have been institutionalized and a large number of entrepreneurs have started various self employment activities.

- Revival of lac cultivation in the districts of Palamu, Garhwa, Ranchi, Bokaro and Jamtara.

- KVKs like Ranchi, Hazaribagh, Pakur, Dhanbad, Godda, Dumka and Palamu serve as resource centers for supply of planting materials, animal and bird breed, fish seed, mushroom spawn and bio-fertilizers.

- The KVKs have developed effective and strong linkage with various stake holding organizations.

Dr. Singh also mentioned that in spite of achievements made by the KVKs, some constraints in and remedies for technological backstopping, which include:

- The over-seeing, monitoring and backstopping mechanisms need to be strengthened in terms of manpower and related facilities.

- Failure stories related to technology, methodology and approach should be documented and analyzed for learning in future.

- Deviation from mandated activities by the KVKs under pressure from host organization needs attention of ICAR.

In the end, Dr. Singh suggested that as KVK is a vital partner of technology management system; therefore, paradigm shifts are required for developing the competencies of KVK personnel in context of changing agricultural scenario. For this, system of technological backstopping needs to be strengthened and to meet this requirement, extension research has to be simultaneously strengthened. This would
answer the kind of extension education, new tools and techniques and new approaches required. He added that efficient adoption is characterized by prolonged coexistence of alternative technologies so, backstopping of KVKs should be done with this focal point in view.

**Backstopping of KVKs for Technology Management, Business Planning & Development- Experiences of ICAR:** Dr. C.N. Ravishankar, ZTM & BPD unit, CIFT, Cochin

Dr. C. N. Ravishankar, Head, ZTM and BPD, Cochin explained the experiences of ICAR on backstopping of KVKs for technology management, business planning and development. He deliberated upon how to link KVKs with the ZTM and BPD for commercialization of ICAR technology. He stressed upon effective IP management and providing infrastructure to entrepreneurs. He mentioned about the technologies commercialized on fisheries by ICAR through ZTM-BPD Unit. He told that branding and labeling of agricultural products KVK, Narakkal, helped in improving adoption rate by the farmers. He presented case studies of backstopping of technology for Pathanamthitta KVK; Wayanad KVK; and Narakkal KVK. The details of his deliberations are as under.

Dr. Ravishankar stated that with the aim of utilizing the vast research and development facilities and knowledge available with its institutions, ICAR started a technology management and business incubation drive, designed for the Indian agricultural sector to promote agribusiness. This initiative started with the establishment of Zonal Technology Management – Business Planning and Development (ZTM-BPD) Units at five different zones in India, which effectively networked all ICAR research institutions for the management of new and cutting edge technologies developed by these institutions. The ZTM-BPD Unit for South Zone established at Central Institute of Fisheries Technology (CIFT), Cochin, Kerala acts as the zonal hub for R&D information management, technology transfer and commercialization for ICAR research institutions situated in the states of Kerala, Tamil Nadu, Karnataka and Andhra Pradesh.

He also added that the collaborative network under South Zone includes ICAR institutions specialized in the field of horticulture, crop science, fisheries, animal science and natural resource management. The new office facility within the premises of CIFT having exclusive in-house facilities such as air-conditioned office suites with shared facilities of secretarial assistance, video conferencing, communication facilities etc. for the incubates.
He added that the Business Incubation Centre (BIC) was inaugurated on 5th April, 2012 by Hon’ble Dr. S. Ayyappan, Secretary DARE & Director General ICAR. This centre has the pilot plant facility which is equipped with state of art generic semi commercial
production facility for fish and meat based products. In this plant, pre-processing, freezing & chilling, value added products, byproducts, extruded products, breading & battering, cooking & canning, packaging and chitin & chitosan facilities are available. He also highlighted the salient achievements which include commercialization of eight technologies, eight patents filed and four brands created.

Case Study: KVK Pathanamthitta, Kerala

Dr. Ravishankar presented a case study of KVK Pathanamthitta, Kerala which is successfully providing backstopping to farming communities and acts as a bridge between research organizations and farming community. The KVK has developed many value added products, mostly regional recipes and has transferred many advanced agricultural technologies to farmers. They are planning to set up a Business Incubation Centre for supporting farmers with the help of Government of Kerala. He also mentioned that providing business support services to farmers, protection and management of intellectual property and entrepreneurial sensitization programmes & managerial trainings are some of the priority areas which need to be developed.
Case Study: CMFRI KVK, Narakkal, Kerala

CMFRI KVK focuses its efforts on major problems and needs of the farming community of the area and caters to the training needs of the farmers. He felt that increase in the adoption rate of technologies by farmers, strengthening the fish seed production activities, inculcation of business and entrepreneurial culture among farming community, particularly among fishers are some of the areas need special attention.

Case Study: KVK Wayanad, Kerala

KVK Wayanad is focussing on technology assessment and refinement, conducting front line demonstrations and imparting need based trainings to the target groups that includes tribals and entire farming community of Wayanad. Entrepreneurial sensitization programmes and managerial trainings for farmers and providing business support services to farmers are the priority areas.

He summarized that the outreach of KVKs have broadened through ZTM-BPD units and closer collaboration with specialized research institutes and agri incubation centers has been established. He emphasized the need to create more conducive business environment, which stimulates vibrant and innovative entrepreneurial activities.

Scientifically Integrated Herbal Solutions for Enhanced Livestock Index and Profits: Dr. Anup Kalra, CEO, Ayurvet Limited

Dr. Anup Kalra, CEO, Ayurvet Limited made a presentation on scientifically integrated herbal solutions for enhanced livestock index and profits for farmers with special emphasis on integrated herbal solutions for enhanced livestock health management. He mentioned that integration of agriculture and livestock is the order of the day rather than sole agricultural practices. He discussed how to improve animal health through Ayurveda. Ayurvet Limited was born out of Dabur and founded in 1992 and is working on the principles of Yajurveda i.e. the science of life, based on strong pillar of positive health. It is a holistic approach to total healthcare by means of preventive and curative medicine to maintain complete internal-milieu (dhatusamaya), ‘Homeo-stasis’ or equilibrium of the various dhatus. The health is state of complete physical, mental and social wellbeing and not necessarily the absence of disease and infirmity. The company is working on these lines by using traditional knowledge blended with modern research for enhancement of animal health index. Four Ingredients of profitable livestock operations are breed, nutrition, health & hygiene and optimization of vital organs/ systems for quality output. Nationally important production challenges in case of dairy sector are mastitis, infertility, FMD, milk fever & ketosis, ruminal dysfunctions and skin disorders, while in case of poultry,
stressed & immune suppression, suboptimal vaccination, multiple mycotoxin in feed, liver dysfunction, intestinal disorders and nutritional imbalance etc. are the major challenges.

Dr. Kalra mentioned that mastitis is one of the major production constraints and an important disease of productive animals for which Ayurvet Company started R&D in 1994 by making Mastitis management cell. Mastitis is either inflamed (clinical) or normal (subclinical). Economic losses due to mastitis include reduced milk production, poor quality of milk and milk discard which ultimately cause financial losses apart from additional treatment costs and udder losses (damage to the alveoli and fibrosis of the udder). Early detection and early control is the key to Mastitis management. The company explored the opportunity in 1994 for developing non antibiotic solution which can enhance udder immunity and reduce infection; improve surface hygiene; and facilitate immune modulation with help of herbs. He added that limitations of present approach are diagnosis, risk of injury to teat canal, recurrence, withdrawal time, limited effectiveness, drug resistance and high cost. Defense mechanism of mammary gland i.e. Keratin (1st line of defense) and resident cell population (2nd line of defense) play an important role in disease immunity in different animals. He also added that the company has developed a revolutionary duo of Mastrip and Mastilep for mastitis management. Mastrip is Cellulose based Bromothymol Blue (BTB) strip impregnated with stabilized ion sensitive indicator for detection of sub clinical mastitis. Mastitis disease can be controlled and milk yield can be increased through use of Mastrip and Mastoilep, two Ayurveda products of the company which are also very cheap and available in the market. The therapeutic efficacy of AV/AMP/14 (Mastrip and Mastilep) in treating sub clinical mastitis of variable etiology has been validated by various institutes. Relative frequency of micro-organisms isolated from milk samples of cows suffering from sub-clinical mastitis and effect of Mastilep treatment on milk yield and somatic cell counts has been very well documented. He stated that the results of Ayurvet has been found significantly better than other indirect tests. Mastilep therapy has been useful in enhancement of udder immunity as evident by significant increase in phagocytic index of neutrophils after treatment giving better fighting ability to mammary cells against the pathogens. Mastilep serves as an excellent therapeutic aid in clinical mastitis along with parental antibiotic.

He informed that the company has organized technical symposium on Mastitis for scientific deliberations while farmer’s meets, clean milk more milk campaign; mass awareness and environment saving campaigns for awareness amongst the farmers are regularly organized. Over 18 lakh animals have been treated successfully with mastilep and about more than 21 reports and 10 thesis published. The 2020 vision of the company is to get milk from mastitis free animals. The company has planned to organize a National Conference on Mastitis and Milk Quality in 2013 and an International Conference on Mastitis in 2015. Apart from mastitis, several other reproductive disorders like retention of placenta, metritis, anoestrus and repeat breeding etc. can obstruct the smooth and timely post calving conception thereby huge economic losses. The company has been in
research and development to fight against these disorders also and serving the farmers by offering cheap and viable solutions. The company is offering various products to the farmers in livestock sector. Owing to its quality services the company has been recognized and awarded at various platforms. The modern state of art R&D facilities has contributed in all for 400 research publication and 99 thesis in M.V.Sc & PhD programs. Some of the flagship brands of the company include Methiorep, Superliv, Vilocym, Ruchamax, Exapar and Mastilep. The company is utilizing the traditional wisdom i.e. integration of 5Fs (food, feed, fodder, fuel and fertilizer) for sustainable, value added and scientifically integrated solutions to livestock problems. Successful installations of maize, barley, oat green feed and paddy nursery apart from solutions for fuel and fertilizers (biogas and bio slurry) have been popularized. Medicinal plant cultivation for enhancing farm incomes, conserve bio diversity and to prevent destruction of forests is another venture of the company. He stated that the company is working in close association with ICAR/ KVKs (Sambandh Green Partnership) for increasing farm income and prosperity of farming community.

**PPP Experiences of United Phosphates Limited:** Dr. Vinyak Sharma, UPL

Dr. Vinyak Sharma, UPL, Advanta discussed about PPP experiences of United Phosphates Limited. He mentioned that a complete value chain has been developed starting from input to post harvest offered to the consumers. UPL is now functioning in 133 countries and through 25 manufacturing units. He stated that United Phosphorus Limited (UPL), incorporated in 1969 started as a small scale unit for manufacturing of Red Phosphorus. By multiple acquisitions, backward and forward integration, UPL have become a leading global producer of crop protection products, intermediates, especially chemicals, industrial chemicals and seeds. UPL has dedicated team of experts in different parts of the world that strive to improve the profitability of the entire farmer fraternity. He also added that Advanta is the seed arm of UPL and it is the first Indian multinational seed company with global foot prints. The company has strong presence both in domestic and international markets.

He told that across the globe, Advanta enjoys leadership position in soghum, sunflower and tropical corn. In India, its strength also lies in hybrid rice, cotton, pearl millet and mustard. The company has adopted latest technological innovations for crop research programmes. Advanced techniques and
molecular marker technology are some of the technologies that have successfully adopted in the crop improvement programmes. The company has also made liaison with some leading companies of the globe for value added biotech traits like pest resistance, herbicide and drought tolerance. Sunflower breeding programme is one of the largest and strongest among the breeding groups in the world. Advanta has successfully developed novel natural oil from sunflower seed which is popularly known as Nutrisun. The company has recently launched a first hybrid in mustard (juncea). He further informed that Advanta’s acquisition of vegetable seed business of Golden Seeds Pvt. Ltd. and Unicorn seeds Limited augmented Advanta’s platform in vegetable crop seeds. The company is now focusing on fodder segment that include round the year availability of green fodder to improve animal health and milk production.

Dr. Vinayak informed that to help farmer significantly to improve their living standard UPL launched first Unimart- a farm advisory and solution centre at Manchar, Maharashtra in December, 2009. After the huge success of this centre, 10 more centers have been opened in the country. Experts visit at farmer’s field, home delivery of products, library services to enhance the knowledge of the farmers, various farmer training programmes are some of the highly acclaimed services of Unimart. Apart, Unimart also offers a series of products like vegetable seeds, field crop seeds, insecticides, fungicides, herbicides, micro nutrients and fertilizers to the farmers. The Unimart centre is transferring the technologies from lab to land and equipping the farmers with the latest products and crop economics. Thousands of farmers got connected to Unimart in three years getting right advice at right time through toll free call service (1800-233-5656) and has guided farmers to use new technology in agriculture like cauliflower under drip irrigation. Unimart has provided farmers with the information about market prices of five nearby mandis, which assist farmers to realize better price of their products.

Dr. Vinayak stated that UPL is one of the first companies in India who started the FFS in ‘Goragacha’ village in Nadia in 1999. The main emphasis was imparting knowledge,
crop diversification, organic farming and judicious use of scarce farm resources. He also mentioned that UPL under PPP mode has been involved in National Food Security Mission (Bihar, Jharkhand, UP & West Bengal), corn cultivation improvement project of WEF (Maharashtra), corn project of DSAG for tribal areas (Gujarat), participation in State & Central subsidy schemes of agri inputs, collaboration with universities/ institutions for extension activities and partnering with KVK’s in knowledge dissemination/ technology transfer. He mentioned that UPL’s major participation under PPP has been the development of Hybrid paddy in West Bengal, Bihar, Assam and Jharkhand; Sunflower in West Bengal; and Orissa and Corn in Assam.

He also added that UPL-KVK connect has taken some initiatives through a project VAKB (Village Agriculture Knowledge Business Hub) which is a joint venture with Krishi Vigyan Kendra, Durgapur, Amravati, Maharashtra. He added that all the seven centers (Bhatkuli, Anjangoan, Loni Takli, Hiwra, Belora & Dabha) were connected with each other and KVK via internet. The centre incharge, guides the farmers from time to time regarding the prices of produce, the weather condition, pest and disease control, fertilizer use, government schemes and new farm techniques.
Mahindra Kisan Samridhi Programmes and Approaches: Mr. Harshvardhan Nawathe, Mahindra & Mahindra Limited

A presentation by Mahindra Kisan Samridhi programmes and approaches was made by Sh. Harshvardhan Nawathe. He informed that the company is a global company
operating with 18 industries through its presence in 80 countries comprising 112000 employees across the world. It is number one manufacturer of tractors in the world and it has 43 percent of domestic market. He added that farm equipment sector of company has customer base of more than 26 lakh tractor owners, largest network of sales and service points having global footprint, market leader for last 29 years (41.4% market share) and is the largest tractor company in the world by volume.

He also stated that Mahindra & Mahindra farm equipment sector is moving beyond tractors to agri-solutions for farm tech prosperity by providing agri solutions through innovative farming technologies. Customer centric value proposition of Mahindra Samriddhi offers innovative farming technologies to increase farm productivity thereby enhancing rural prosperity. Tractor dealerships are transformed to Samriddhi centers that disseminate innovative farming technologies through various delivery channels across the agri value chain. The company has also successfully taken up agri-counseling, agripreneur development, custom hiring service etc. with partnership of agricultural universities. The group is also contributing in results and methods demonstration, exposure visit of farmers and content development on 50 crops. They also provide different kinds of awards to the farmers, groups and Institutions in agricultural sector like Kissan No. 1 Mahindra Samriddhi Award, India Agri Awards etc. It has proposed to have stronger linkages with KVKs in technology integration and involvement of farmers in different activities.

He mentioned that Mahindra Samriddhi India Agri Awards have been constituted for identifying the innovative technologies and disseminating these to the farmer’s front. Mahindra Samriddhi has joined hands and are knowledge partners with ICAR and state agricultural universities like TNAU, Coimbatore; ANGRAU, Hyderabad; BHU, Varanasi; UAS, Dharwad; PAU, Ludhiana, MPKV, Rahuri; GBPUAT, Pantnagar; JNKVV, Jabalpur; JAU, Junagadh; and MPUAT, Udaipur. Under reward program for farm productivity
enhancement at Samriddhi centers more than 120 farmers with spouse were felicitated for farm productivity enhancement. Mahindra Samriddhi India Agri Awards has been launched in 2011 to honor the Heroes of Indian agriculture at national level for commending purposeful contributions which made a difference in field of agriculture to enhance farm productivity and drive farmer prosperity. These award ceremonies have been organized successfully for two years and are now going to be more purposeful. There are 29 awards in categories which comprise of certificates, trophies, prize money (Winner Rs. 211000 at national level, Runner up (institutions) Rs. 101000 and runner up (farmer) at regional level Rs. 51000 and lifetime achievement award Rs. 5 lakhs). A special category for KVKs has been added for MSIAA 2013. Critical points for Krishi Vigyan Kendra Samman (KVK) & Krishi Sahyog Samman (NGO/SHG) awards are two farming technologies disseminated by Krishi Vigyan Kendra/ NGO/ SHG between April to October of previous year with case studies and relevant photographs while for Krishi Siksha Samman (Agriculture University) & Krishi Sansthan Samman (PSO) the requirements are two IFTs developed by Agriculture University/ PSO between April to October of previous year with brief research summary and photographs. He desired to give wider publicity to these awards for which contact persons and nomination forms are available on company website.
Sunhera Kal- A KVK-JCB Unique Collaboration Bringing Progressive Difference in Rural India: Sh. Puneet Vidyarthi, GM & Head, Rural JCB India Limited, Ballabgarh

Mr. Puneet Vidyarthi, General Manager and Head Rural, JCB India limited made a presentation on KVK-JCB unique collaboration bringing progressive difference in rural India and showed a video film on technology transfer by JCB. The group consists of 18 plants and spread in more than 150 countries with 770 plus dealers and more than 2000 outlets. JCB India is largest manufacturer of construction equipments. Agricultural centers and scientists engaged in joint ventures with private sector companies ensuring the least lab to field time in a structured format, engaging all stakeholders.

He added that they have started an outreach programme on public private partnership i.e. KVK/JCB programme Sunehra Kal for mechanizing agriculture, encourage entrepreneurship, generate employment, all round prosperity through potential of additional income and create rural empowerment. The modus operandi includes technical sessions (on versatility of the JCB backhoe loaders, agriculture and allied agricultural applications and economic model) and field demonstrations/ hands on trainings. Programme has been organized in 25 KVKs on farm mechanization, land leveling, drainage

Pineapple plantation  Coconut plantation

Rain water harvesting tanks  Agricultural land preparation
etc. He hoped that the joint venture of JCB and KVKs will help in technology transfer, empowerment of farmers and entrepreneurs, upgradation of farmer’s/village economic standards, application of Government/NABARD schemes to create entrepreneurship, agri & allied applications, exploitation of resources and land preparation for additional income etc. He also mentioned about JCB 2DX, a machine with many applications and the company is hoping that every village will have one in future.

Innovation: An integrated approach by Falcon Garden Tools Limited: Miss Rasleen Duo, Falcon Garden Tools Limited

Representative from Falcon Company Limited made presentation on various garden/orchard tools available with the company for mechanization of various tedious operations. Falcon Garden Tools Pvt. Ltd. is a professionally organized company and an eminent manufacturer and exporter of FALCON premium agricultural, horticultural, gardening and forestry equipment and tools. With an integrated approach towards agricultural development, they provide best quality products with superior quality materials and latest technology. The tools are very popular amongst the renowned horticulturists of various states in the country as well as the export market. The company is exporting its products to more than 15 countries of Europe, America, New Zealand, Africa and South Asia. Falcon has used practical application of crop and soil sciences to produce high quality and efficient tools that cater to both professionals as well as small farmers. The most tools supplied by the company have additive advantage and based on innovative technologies with focus on manual to mechanical tools. She made a mention of various tools which already had made impact in the country.

The speaker added that the company has well developed infrastructure with world class research and development facilities with Japanese collaboration. Facilities like 3D designing & modeling on solid works and high end quality testing laboratories make the instruments more practicable and friendly for the operators. International collaboration
with Campagnola (Founded in Bologna, Italy) in 1958, Campagnola occupies a leading position in the world market of pneumatic & electromechanical pruning and harvesting systems) and Zenoah (Husqvarna Zenoah Co., Ltd., is the leading manufacturer of Outdoor Power Equipment in Japan. It has a long history of notable achievements.

**Anvil type loaper**
**2x gear loaper (The gear helps in increasing leverage and reducing force)**

**Traditional way of pruning**
**Falcon’s multi power long reach pruners**

**Grafting tools (convenient to use and accurate & successful grafts)**
**Pruning secateurs (by pass type) Revocut 225mm (revolving handle, exerts very less pressure on hand and better output)**
Women friendly tools

Garden tools

Rotary tiller/ cultivator (Designed for vegetable and flower gardens or small holdings, compact and lightweight which allow problem-free tillage)

FALCON step by step seeder (It’s a new seed drill which uses the sowing system in step (row after row) in a completely automatic stage of advancement in sowing)

Compressor with pneumatic loaper
The speaker also mentioned that the Falcon Company has been awarded various National & State Level Awards for quality products. The company in addition to its mandated activities is also doing social activities in the rural areas like eye check up camps, no tobacco days etc.
After the deliberations by various speakers, Dr. A.K. Singh, ZPD, Zone IV mentioned that there is a need to bring professionalism in KVK system while Director, IIPR, stressed the need for refinement of technology at district level.

At the end of the session Dr. V.V. Sadamate moderated the discussion and some of the points emerged out are:

- KVK should act as resource centre for private and public sector organizations.
- Although, KVKs have done extremely well in some catchment area, however, up-scaling of technology is falling little short and there is need to decide the priorities for partnership and areas of partnership need to be identified.
- National Missions on Agricultural Extension and also for Sustainable Agriculture to be started in XII plan. Agricultural Universities and KVKs should find a place in the activities of these missions.

The chairman thanked the DDG, organizers and speakers at the end.

**Recommendations**

- KVKs have to be linked with ZTM and BPD units for effective backstopping and commercialization of assessed and refined technologies.
- Effective public-private partnership has to be encouraged for raising agricultural productivity and enhancing farmers’ income. Such partnership should serve mutual interests of farmers, KVKs and the Corporates to ensure availability of required quality inputs, diagnostic and advisory on soil and plant health and assistance in profitable marketing of produce.
- The agro-input companies should form a Consortium and develop long-term strategic partnership with KVK system for working on issues of national importance like conservation of natural resources, renewable energy, malnutrition, risk mitigation, input use efficiency in agriculture, gender disparity etc.
- The KVK system should provide technological backstopping to the agricultural programmes and such other initiatives of private sector designed as part of their Corporate Social Responsibility for the small and marginal farmers and landless agricultural labourers.
- Successful models of public-private convergence may be collated and the processes facilitating need to be brought out and used for up-scaling.
Valedictory Session

Welcome Address : Dr. A. M. Narula, Zonal Project Director, Zone-I, Ludhiana

Remarks and Recommendations : Dr. K. D. Kokate, DDG (AE), ICAR, New Delhi

Address by Chief Guest : Dr. Gurbachan Singh, Chairman, ASRB, New Delhi

Concluding Remarks : Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana

Vote of Thanks : Dr. V. Venkatasubramanian, ADG (AE), ICAR, New Delhi

: Dr. M.S. Gill, DEE, PAU, Ludhiana

Rapporteurs : Dr. V.P. Chahal, Principal Scientist, (AE), ICAR, New Delhi

: Dr. N. Girdhar, Senior Scientist (AE), ICAR, New Delhi
A View of Valedictory Session
The valedictory session of the 7th National Conference on KVK was held on 22, November, 2012 at Punjab Agricultural University, Ludhiana. Dr. Gurbachan Singh, Chairman, Agricultural Scientist Recruitment Board, New Delhi was the chief guest of the session.

Welcome Address

The session commenced with the welcome address by Dr. A. M. Narula, Zonal Project Director, Zone-I, Ludhiana. He welcomed the Chief Guest of the function Dr. Gurbachan Singh, Chairman, ASRB, New Delhi; other dignitaries and delegates. He expressed happiness for successful completion of the Conference. He extended his gratitude to all dignitaries and delegates for actively participating in the Conference.

Remarks and Recommendations

Dr. K.D. Kokate, DDG (AE), ICAR, New Delhi presented the major recommendations emerged out of the deliberations during various technical sessions. At the outset, Dr. Kokate welcomed the Chief Guest Dr. Gurbachan Singh. He briefed the House that hosting the KVK Conference was started in 2005 with the objectives of capacity/confidence building and cross learning of the Programme Coordinators (PCs). He hoped that with the theme of “Integrating Technologies and Best practices”, the Conference must have been encouraging and interesting for the participants.

There were eight Technical Sessions and two Special Lectures, one by FAO Representative Dr. Peter E. Kenmore on “Krishi Vigyan Kendras: India’s Institutional Innovation Inspiring the World in the 21st Century” and another by Mr. Sunil Parekh on “Programming Mind for Success and Unleashing Human Potential for Higher Productivity”. He urged the PCs to interact with the staff of KVKs and Line Departments.
and other stakeholders of their respective districts about the deliberations of the Conference after going back. The DDG (AE) also discussed some of the major recommendations and sought suggestions on the same. The session wise recommendations presented by DDG (AE) are as follows:

**Technical Session-1: Convergence and Linkage Between KVK-ATMA Programmes-Best Successful Cases of Field Extension**

The session was conceptualized with an idea to share/ highlight the importance of “Convergence and linkages between KVK-ATMA programmes for field extension activities”. In this session, eleven best successful cases of field extension were presented by Project Director ATMA and/or Programme Coordinators KVK representing eleven districts of the country. The following recommendations were suggested under this session.

- The success achieved in the institutional and functional linkages between ATMA and KVK need further catalyzing it for nation-wide up-scaling.
- The successful process and methodological aspects of KVK-ATMA convergence should be documented elaborately and made available to all the stakeholders for replication as per the needs of the district.
- ATMA-KVK convergence is essential for developing each village into Knowledge Centre. As the number of farmers and area to be covered in each district is huge, farmer-to-farmer extension needs to be institutionalized through ATMA-KVK convergence.
- As there cannot be any substitution to public extension, public and private extension systems must work synergistically to achieve the welfare of all categories of farmers.
- Feed forward provided by the KVK to ATMA and the utility of feedback received from ATMA in preparation of action plan of KVK has been a major gain of the convergence and needs to be harnessed appropriately.
- Funds flow from ATMA to KVKs is highly skewed and varies from district to district and hence, there is a need for uniformity in funds flow to all the KVKs and must be provided to KVKs directly.
- Planning must be bottom-up and involvement of farmers in this process is very crucial, particularly in the promotion of market-led extension.
- Pre-seasonal interfaces between ICAR and DAC must include Vice-Chancellors of SAUs so that issues related to convergence can be discussed.
- Technical backstopping of KVK and ATMA by the ICAR institutes and SAUs needs special attention.
• There is a need for revisiting the joint circular on convergence to make the convergence process more operationally feasible. Some of the proposed changes include quarterly meetings, earmarking of funds to KVKs, visit of ATMA staff to the cluster villages of KVKs and ATMA sponsorship for Technology Weeks being organized by KVKs.

• The Directors of Extension Education (DEEs) of all the SAUs must consult the SREPs and DAAPs of all the districts and guide the KVKs in developing their action plans.

• KVKs should be guided by DEEs and ZPDs and be given operational freedom and flexibility for managing and conducting Research-Extension-Farmer (R-E-F) linkage activities under ATMA without diluting the mandated activities of KVKs.

• The successful agri-entrepreneurs could be used for mobilizing other farmers through PPP mode jointly by KVK and ATMA as per provisions in the ATMA scheme.

• Orientation of Farmer Friends (FF) and Block Level Farmers Advisory Committee Members (BFACs) may be done by KVKs on regular basis.

**Technical Session-2: KVK’s Best Practices and Innovative Approaches for Out-scaling Technologies**

Best practices and technologies can sustainably increase productivity and leverage agriculture poverty reduction potential if these are shared, deployed and adapted across the locations with specific minor modifications. Scaling up best practices, deploying innovations and sharing knowledge has to become priorities for the future agricultural agenda, with complementary role of KVKs in achieving sustainable agriculture through its best practices and innovative approaches for out-scaling technologies. In this session, fourteen case studies of KVK’s Best Practices and Innovative Approaches for out-scaling technologies were presented by Programme Coordinators of various KVKs representing fourteen districts of the country. From the discussions, the following recommendations emerged in order to out-scale these technologies.

• Successful custom hiring and entrepreneurship development models and programs of NICRA project involving tribal and other resource poor farmers with focus on human capital, social, psychological and poverty alleviation approaches may be documented and up-scaled in other villages.

• The climate resilient technologies like conservation agriculture, zero tillage, varietal replacement, direct seeded rice, woman specific technologies etc., demonstrated by KVKs under NICRA project need to be documented and shared with ATMA for large scale adoption.
• There is a score for large scale adoption of agro-technologies like DSR, suitable paddy cultivars cum fish culture, farm mechanization, ZT wheat, inter-cropping in sugarcane for increasing production of rice, wheat and sugarcane crops with higher returns per unit area in flood prone areas.

• Emphasis should be laid on intensive awareness for water conservation through use of mini sprinkler/drip irrigation, use of mulching including plastic mulch, integrated water management approach through Public Private Community partnership.

• In rainfed areas, use of rain gun or sprinkler at critical stages such as flowering, peg formation and pod development and intercropping of groundnut + castor or cotton be followed for higher crop sustenance.

• For reduction in investments towards the purchase of external inputs, community based institutions/user groups should be created for effective utilization of farm and home resources. Special emphasis be laid on livelihood security through group based approach, soil and water conservation through watershed approach, animal health promotion and welfare, commercial nursery promotion and scientific grain storage.

• KVKs should lay emphasis on Integrated farming system models for small and marginal land holdings.

• Conservation agriculture using zero tillage and varietal replacement, women empowerment through integrated activities including women SHGs and capacity building of youth volunteers/youth groups should be followed across the locations.

• Replacement of wheat straw with paddy straw (20 to 50%) for mushroom cultivation and diversification of rice-wheat cropping system in favour of summer moong should be up-scaled on large scale in northern states.

**Technical Session-3: Best Practices and Technologies for Higher Production, Value Addition and Improved Livelihood**

A special presentation by Peter E. Kenmore (FAO Representative in India) was made on ‘Krishi Vigyan Kendra- India’s Institutional Innovations inspiring the World in the 21st century’. Apart from this, other speakers also deliberated on the topics that include “Improving production and productivity of field crops; Engineering technologies for higher productivity and profitability; Horticultural technologies for higher production, value addition and improved livelihood and Best practices and technologies for higher production, value addition and improved livelihood in Fisheries & Aquaculture. Based on the deliberations, the following recommendations were drawn:

• The KVK has emerged as institutional innovation for carrying out adaptive research like technology assessment, refinement and its demonstration in farmer’s field.
The KVK system should partner with global organization like FAO for mutual benefit and replicating KVK like institutions in other countries keeping in view their needs and requirements.

• The ICAR institutes and agricultural universities should ensure technology flow to KVKs to reduce the time lag in application of frontier technologies related crop science; horticulture; farm machinery implements and agro-processing; livestock; fisheries; and aquaculture and other suitable enterprise.

• Livestock- based advisory and diagnostics may also be given priority in KVK programs.

• The fisheries sector requires collective wisdom, implementable policies, clear vision for future, large investment in infrastructure, access to local & distant markets and safeguards against natural disasters for further holistic progress of fisheries.

Technical Session- 4: Facilitating KVKs in Management, Administrative & Financial Matters

This session was held under the Chairmanship of Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR. Besides technical programme of KVKs, critical inputs and issues of delegates of different cadres as well as different organizations in terms of management, administration, financial matters were discussed in this session. The following recommendations were drawn in order to increase the effectiveness of KVKs:

• Timely flow of funds from host organizations to KVKs may be given priority.

• The Programme Coodinators of KVKs should be given/delegated administrative and financial powers equivalent to Heads of Departments/Divisions in AUs and ICAR Institutes.

• Timely submission of Actual Expenditure Statement as well as Audited Utilization Certificate by the host organizations for further release of funds and effective implementation of technical programme, must be ensured by the KVKs.

• Lacunae are being observed in the proposals of condemnation of KVK vehicles, these should be screened thoroughly by the host organizations to avoid delay in the process and therefore it is suggested that condemnation of vehicles should be proposed based on the approved rules of ICAR (GFRs).

• Diversion of funds must be stopped i.e. the fund allocated for capital assets should not be used in revenue head and vice-versa. Re-appropriation of budget must be approved from the ICAR. The expenditure should not exceed the approved budget.

• Vacant posts in KVKs should be filled-up as soon as possible as per latest qualifications and in consultation with Zonal Project Directors.
• The revolving fund provided to KVKs must be returned to ICAR within 5 years.
• Provision of reservation to physically challenged persons must be made irrespective of host organization as per rules.
• Custom hiring, IFS and rain water harvesting structures may be extended to more number of KVKs.
• Motivation in terms of remote area allowance/ difficult area allowance may be paid to the KVK staff as per the existing rules to avoid the frequent transfers.
• Refreshment charges for trainings need to be enhanced as per provisions equal to other schemes of Government of India.
• Convergence with line departments may be followed without affecting the core functions of KVKs.
• Provision of TA/DA may be made for innovative farmers and Farm Innovators’ Meets should be organized at least once in a year.
• The pay scales of the SMSs should be at par with those of Assistant Professors of SAUs and Scientists of ICAR Institute and gratuity may be extended to KVK staff irrespective of host organizations.
• Guidelines with respect to administrative and financial matters of KVKs may be circulated to all host organizations as well as KVKs.
• Availability of seeds of newly released varieties and hybrids is a constraint for KVKs, the DEEs and ZPDs should ensure the availability of seeds of newly released varieties and hybrids to KVKs.
• National level repository of technologies and best practices may be prepared and circulated among KVKs for better utilization and up-scaling.
• Some of the KVKs may be provided additional funds and developed as Centre of Excellence or specialized KVKs during XII plan.
• There is a need for regular capacity building of ‘administrative and accounts’ staff of KVKs and ZPDs on office procedures and financial management.
• Vice-Chancellors of AUs should be in constant touch with the DEEs for effective functioning of KVKs. A quarterly review meeting of all KVKs should be held under the chairmanship of VC to review the functioning of KVKs.
• DEEs should play active role in KVK monitoring and technological inventory prepared by SAUs need to be updated regularly.
• Criteria for Zonal KVK Awards may be re-looked as it is not based only on the documentation, hence ZPDs may be involved in short listing of the KVKs.
• Proper documentation of work done by the KVKs and its impact assessment may be given utmost priority.
Technical Session- 5: Farm Innovations and Best Practices Developed by Farmers

Farmers in the rural India are practicing many innovative technologies, which need to be recognized and documented. These grass root level farm innovators need to be provided appropriate opportunities and platform for wider sharing of their innovative experiences. The research institutions must also redirect their priorities to work and support local development initiatives and protect farmers’ knowledge for sustainable development. Considering the importance of these local innovations of the farming community, this special session was kept in the technical programme of the conference. Altogether, 15 farmers/ farm women presented their innovative practices in this session and based on the deliberations, following recommendations were drawn:

- The KVKs should identify more number of farm innovations and best practices developed by farmers for their assessment and validation. If needed help of SAUs/ ICAR Institutes may be sought. The validated practices should be up-scaled by KVKs, ATMA and line departments for the benefit of small and marginal as well as resource-poor farmers.
- Prototype of farm implements should be developed in public private partnership mode for providing such facilities to other farmers.
- Services of Innovator farmers should be utilized by the KVKs for motivating other farmers.

Technical Session- 6: ICT Mediated Best Practices in Knowledge Empowerment of Farmers

The usefulness of ICT in extension management has also been felt in the recent past to speed up the process of technology dissemination in agriculture to harness the full potential of latest technologies being developed by National Agricultural Research System. KVKs in particular could play a vital role in this sector owing to their network in every corner of the country. Therefore, a special session on ‘ICT mediated best practices in knowledge empowerment of farmers’ was hence held in the Conference to have deliberations on this important aspect. A total of five presentations were held under this session. The following action points were drawn based on the deliberation for further up-scaling of ICT:

- The experiences of “Digital Green” in documentation of best practices through community participatory video clips provide scope for interactive and horizontal learning. Such ICT mediated approach can further be tested and refined by KVKs in public-private partnership mode to establish its relevance in field extension.
Research on ICT application in terms of cost effective information acquisition, improving efficiency of KVKs, impact of ICT interventions and linkages with organizations need to be strengthened.

Strategic collaboration of partners is to be encouraged for ICT based knowledge modeling in view of local knowledge base, local needs and research-based outputs as well as socio-economic and cultural factors besides content and capacity building of the partners.

Innovations in Mobile-based information system have tremendous scope of more coverage of farmers, last mile connectivity and interactivity. The experiences of mKRISHI and IKSL are encouraging and can further be improved based on feedback and public private partnership.

Capacity building of KVK staff through ICT mediated tools may be encouraged for data acquisition, processing, analysis, and sharing from remote sensing for effective functioning of KVKs.

Technical Session- 7: Integration of Best Practices and Technologies under NICRA Project

In all, 12 presentations (one by Dr. Srinivasa Rao, Principal Scientist, CRIDA and 11 by the PCs of KVKs) were made during the session. Based on the deliberations, the following recommendations were drawn:

- NICRA project need to be extended to other districts in all Zones, preferably 25 additional districts in each Zone
- Technological interventions being undertaken under NICRA need to be converged with other Government schemes such as RKVY, MGNREGA etc.
- Cost effective technologies such as zero tillage, water harvesting and conservation methods, custom hiring of implements and many more need to be up-scaled under NICRA.
- Increased degree of cross learning is required among the KVKs operating NICRA project.
- The scientific issues of technological interventions, success stories, constraints and bottlenecks faced during the implementation period need to be documented for ready reference by the stakeholders.
- Response of technologies under varied conditions of biotic and abiotic stress need to be assessed before taking up under demonstrations.
Technical Session- 8: Technological Backstopping and Harnessing Synergy of Working in Partnership Mode

The session was conceptualized to lay emphasis on reforms required for harnessing synergies of public private partnership for the benefit of farming community and faster dissemination of technologies. In this session, 12 presentations were made and the recommendations emerged out are as under:

- KVKs have to be linked with ZTM and BPD units for effective backstopping and commercialization of assessed and refined technologies.
- Effective public-private partnership has to be encouraged for raising agricultural productivity and enhancing farmers’ income. Such partnership should serve mutual interest of farmers, KVKs and the Corporates to ensure availability of required quality inputs, diagnostic and advisory on soil and plant health and assistance in profitable marketing of produce.
- The agro-input companies should form a Consortium and develop long term strategic partnership with KVK system for working on issues of national importance like conservation of natural resources, renewable energy, malnutrition, risk mitigation, input use efficiency in agriculture, gender disparity etc.
- The KVK system should provide technological backstopping to the agricultural programmes and such other initiatives of private sector designed as part of their Corporate Social Responsibility for the small and marginal farmers and landless agricultural labourers.
- Successful models of public-private convergence may be collated and the processes facilitating need to be brought out and used for up-scaling.

Address by Chief Guest

At the outset, Dr. Gurbachan Singh, Chairman, ASRB, New Delhi and the Chief Guest of the function, thanked the DDG (AE), ICAR, New Delhi and Zonal Project Director, Zone-I, Ludhiana for inviting him to the function. He opined that such Conferences should have only few prioritized recommendations and efforts must be made to implement those.

He pointed out that agriculture scenario is changing day by day and the priorities are shifting. In this context, anticipatory thinking is very much
important. Last year, the country had record food grain production and credit goes to everyone, but, the KVKs and the farmers are at the top. We produced 257 million tons food grain last year and we have to add 6 to 8 million tons every year to keep pace with the growing population. At the same time, the challenges are to be looked into like, how to address the requirements of farmers having less than 2 hectare land, climate change, over exploitation of ground water, deteriorating soil quality, declining profit margin, diversification on ecological principles etc. Here, the KVKs have to play a big role in taking science to the villages. He emphasized that no nation can grow without science.

Secondly, the KVKs have to bridge the yield gap. For this, the KVK scientists will have to lead the field extension systems as think tank. He gave many examples of up-scaling success stories like; laser land leveling in Punjab; soil and water testing cards in Haryana; SRI and green manuring in Bihar; record rice production during drought year in Assam through shallow ground water exploitation; micro irrigation in Gujarat and Maharashtra; protected cultivation in Uttarakhand; community spraying in Karnataka to prevent disease spread; waste land reclamation in UP etc. The integrated farming on small holdings and its mechanization are the only ways to second green revolution.

Now, we have 630 KVKs in the country. He congratulated the KVKs for providing technological backstopping to district level line departments in implementing mega schemes of agricultural development. Such contribution of KVKs has definitely helped us in getting record food grain production. But, still a lot has to be done. He urged the KVKs to take new seeds to the farmers’ fields. In case of varieties, the boundaries of SAUs should be broken and suitable varieties of any state/SAUs should be promoted. Increasing water availability in rainfed areas is also a big challenge which can be addressed to selection of water efficient crops and through use of available water efficiently. Agricultural problems are complex now. Benchmark the district with respect to change in soil, water, weather and cropping system. Fixing local specific priorities based upon constraints to production and working on them should be the approach of KVK. For example, KVKs of Bathinda, Faridkot, Ferozepur and Muktsar should have salinity management as major priority. The different stake holder of agriculture development will have to dovetail their programmes with each others’ for the better agricultural production. We will have to build the human resource for agricultural development in the country. At last, he congratulated the organizers for successful organization of the Conference.

Concluding Remarks

To start with, Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana welcomed the Chairman, ASRB and Chief Guest of the function and expressed that KVKs are backbone of agriculture extension system in India. He further elaborated that farmers are also researchers/experimenters. There are many things to learn from them. If needed, we
should assess and refine the farmers’ technologies for out-scaling. For example, Tricycle Driven Seed Drill developed by a farmer appears to be very cost effective.

While giving an overview of the Conference, he appreciated the presentations by farmers and KVKs. He also appreciated the exhibitions put during the Conference. He opined that such Conferences give a lot of ideas to work upon. He suggested that the SAUs and KVKs would have to work on technologies by breaking the state boundaries. He emphasized that discipline was very much important for the success. At last, he thanked the Director General, Deputy Director General (Agril. Extension) and other officers of ICAR for providing the opportunity to hold this mega event in the Golden Jubilee Year of the University.

**Vote of Thanks**

The session ended with Vote of Thanks to all the dignitaries, organizers and participants by Dr. V. Venkatasubramanian, ADG (AE), ICAR and Dr. M.S. Gill, DEE, PAU, Ludhiana on behalf of ICAR and PAU, respectively.
Glimpses of Cultural Programme during the Conference
### 7th NATIONAL CONFERENCE ON KVKs

**Theme:** Integrating Technologies and Best Practices  
(20-22 November, 2012)

**PROGRAMME SCHEDULE**

#### INAUGURAL SESSION

**Venue:** Punjab Agricultural University, Ludhiana  
**November 20, 2012**  
**10.00 -12.00 hrs**

<table>
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<tr>
<th>Time</th>
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| 10.00-10.30 hrs | Inauguration of Technology Exhibition and Innovation Market Place  
by Shri Sharad Pawar, Hon’ble Union Minister of Agriculture and  
Food Processing Industries | Dr. B.S. Dhillon  
Vice Chancellor, PAU, Ludhiana |
| 10.30-10.35 hrs | ICAR Song/Invocation/Lighting of lamp | |
| 10.35-10.40 hrs | Welcome address  
: Dr. K. D. Kokate  
DDG (AE), ICAR, New Delhi | |
| 10.40-10.45 hrs | About the Conference  
: Dr. S. Ayyappan  
Secretary, DARE and DG, ICAR  
New Delhi | |
| 10.45-10.53 hrs | Opening Remarks  
: Dr. Charan Das Mahant  
Hon’ble Union Minister of State for  
Agriculture and Food Processing  
Industries | |
| 10.53-11.03 hrs | Special Remarks  
: Shri Sharad Pawar  
Hon’ble Union Minister of Agriculture  
and Food Processing Industries | |
| 11.03-11.05 hrs | Release of Publications  
: Simultaneously by all Dignitaries on  
the Dais | |
| 11.05-11.13 hrs | Conferment of Awards  
: Shri Sharad Pawar  
Hon’ble Union Minister of Agriculture  
and Food Processing Industries | |
| 11.13-11.28 hrs | Inaugural Address  
: Shri Sharad Pawar  
Hon’ble Union Minister of Agriculture  
and Food Processing Industries | |
| 11.28-11.33 hrs | Vote of Thanks  
: Dr A. M. Narula  
Zonal Project Director, Zone-I, Ludhiana | |
| 11.33-11.34 hrs | National Anthem | |
| 11.34-12.00 hrs | High Tea | |
Integrating Technologies and Best Practices
Proceedings of 7th National Conference on KVK

TECHNICAL SESSION–1

Day-1 (November 20, 2011) 12.00-14.00 hrs

Convergence and Linkages between KVK-ATMA Programmes-
Best Successful Cases of Field Extension
(11 Joint presentations by KVK and ATMA)

Chairman: Dr. K. Narayana Gowda
Vice Chancellor, UAS, Bangalore

Panelists:
Dr. K.D. Kokate
DDG (AE), ICAR, New Delhi

Dr. M.L. Chaudhary
Vice Chancellor, BAU, Bhagalpur, Bihar

Dr. Ajay Vir Jakhar
Bharat Krishak Samaj, New Delhi

Rapporteurs:
Dr. M.J. Chandregowda
Principal Scientist, ZPD, Zone-III, Bangalore

Dr. Lakhan Singh
Principal Scientist, ZPD, Zone-IV, Kanpur

1. KVK and ATMA, Puri district
Technology Dissemination Model for Coastal Fisheries
Dr. M.P. Nayak

2. KVK and ATMA, Ahmednagar district
Technology Assistance and Upscaling through Convergence – Cases of Fruit and Shoot Borer in Brinjal and Housing Management for Dairy Animals
Dr. K.V. Deshmukh, Director, ATMA

3. KVK and ATMA, Bareilly
Diversification of Sugarcane Based Production Systems
Dr. Ajai Yadav, Dy. P.D. ATMA

4. KVK and ATMA, Saharanpur district
Convergence for Organizing Farmers and Farm Advisory Services
Dr. V.K. Sisodia, P.D. ATMA

5. KVK and ATMA, Mandi district
KVK-ATMA Convergence: A Case Study of Mandi district
Dr. Rajendra Kumar, DPD, ATMA
6. KVK and ATMA, Bilaspur district
   **Raising Small & Marginal Farm Income through Synergy & Linkages in Programmes**  
   *Dr. L.R. Dhiman, PD, ATMA*

7. KVK and ATMA, Jhalawar district
   **Functional linkages for Field Extension in Jhalawar District**  
   *Dr. R.K. Bagdi, PC, KVK, Jhalawar*

8. KVK and ATMA Ri-Bhoi district
   **Convergence for Extension Programmes and Activities in Ri-Bhoi District - A Success Story**  
   *Dr. E. Hussain, EC, ATMA, Ri-Bhoi*

9. KVK and ATMA Jehanabad district
   **Multifarious Convergence for Field Extension Programmes**  
   *Md. Ismail, PD, ATMA, Jehnabad*

10. KVK and ATMA Katihar district
    **Capacity Building and Entrepreneurial Development of Farmers**  
    *Dr. Divesh Kumar Singh, PD, ATMA, Katihar*

11. KVK and ATMA Namakkal district
    **Convergence for R-E Linkages in technology transfer**  
    *Dr. A. Prabhakaran, PD, ATMA, Namakkal*

14.00-15.00 hrs  
**Lunch Break**

**TECHNICAL SESSION–2**

15.00-17.00 hrs

**KVK’s Best Practices and Innovative Approaches for Out-scaling Technologies**  
(Presentation by 14 KVKs)

*Chairman*

: Dr. O.P. Gill  
Vice Chancellor, MPUA&T, Udaipur

*Panelists*

: Dr. Sudhir Bhargava  
Member, Governing Body, ICAR

: Dr. Krishna Srinath  
Director, DRWA, Bhubaneswar

: Dr. J. V. Patil  
Director, DSR, Hyderabad

: Dr. T. Mahapatra  
Director, CRRI, Cuttack
Integrating Technologies and Best Practices

Proceedings of 7th National Conference on KVK

Rapporteurs

: Dr. S. Prabhu Kumar
  ZPD, Zone-VIII, Bengalore

: Dr. J.S. Chauhan
  Director, Rape Seed Mustard Research, Bharatpur

: Swami Sadananda Ji
  R.K. Mission Neempith, West Bengal

: Dr. Attar Singh
  Principal Scientist, Zone-IV, Kanpur

: Dr. P.P. Rohilla
  Senior Scientist, ZPD, Zone-VI, Jodhpur

1. Technological Interventions for Flood Prone Areas
   Dr. A.K. Dubey, KVK, Kushinagar (Uttar Pradesh)

2. Rehabilitation of Sodic Soils and Development of Related Farming Systems
   Dr. A.K. Srivastava, KVK, Pratapgarh (Uttar Pradesh)

3. Integrated Water Management in Vegetables - A Unique Example of Public Private Community Partnership
   Dr. S. S. Rathore, KVK, Jaipur (Rajasthan)

4. Integrating Technologies for Groundnut and Cotton Crops in Saurashtra Region of Gujarat State
   Dr. B. B. Kabaria, KVK, Rajkot (Gujarat)

5. Integrated Farm Development through Community Resource Centres
   Dr. P. Alagesan, KVK, Erode (Tamil Nadu)

6. Innovative Approaches for Sustainable Farming in Western Ghats
   Dr. Hemant Hegde, KVK, Uttara Kannada (Karnataka)

7. Entrepreneurship Development of Tribal Farmers through Quality Seed Production Programme
   Dr. Vijay Kumar Verma, KVK, Betul (Madhya Pradesh)

   Dr. N. C. Sahu, KVK, Dakshin Dinajpur (West Bengal)

9. Integrated Agricultural Development through Application of Best Practices
   Dr. A. K. Singh, KVK, Ranchi (Jharkhand)

10. Water Harvesting for Multiple Uses
    Dr. Shabir Hussain Wani, KVK, Senapati (Manipur)

11. Crop Diversification in Silt Deposited Areas of Assam
    Dr. Kameswar Das, KVK, Chirang (Assam)
12. Integration of Technologies for Disease Management in Horticultural Crops  
*Dr. S. K. Gupta*, KVK, Solan (Himachal Pradesh)

13. Blending Technologies for Sustaining Natural Resources  
*Dr. A.S. Dahiya*, KVK, Panipat (Haryana)

14. Crop Diversification, Varietal Replacement in Gram and Nutrient Management in Rice  
*Dr. (Mrs.) Dhanalakshmi*, KVK, Kurnool (Andhra Pradesh)

17.00-17.30 hrs  
Tea break

17.30-19.00 hrs  
Visits to Technology Exhibition, Animal Show & Demonstrations

19.00-20.00 hrs  
Cultural Programme

20.00-21.30 hrs  
Dinner

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**TECHNICAL SESSION–3**

Day 2 (November 21, 2012)  
8.30-10.00 hrs

**Best Practices and Technologies for Higher Production, Value Addition and Improved Livelihood**

**Chairman**  
*Dr. S. Ayyappan*  
Secretary, DARE and DG, ICAR, New Delhi

**Special presentation**  
Krishi Vigyan Kendra- India’s Institutional Innovation inspiring the World in the 21st century by *Dr. Peter E. Kenmore* (FAO Representative in India)

**Panelists**  
*Dr. J.S. Sandhu*  
ADG (Seeds), ICAR, New Delhi

*Dr. N.P.S Sirohi*  
ADG (Agril. Engg.), ICAR, New Delhi

*Dr. U. Srivastava*  
ADG (Horticulture), ICAR, New Delhi
Special Remarks

: Shri Kuldeep Dhaliwal
Member, General Body of ICAR Society

Rapporteurs

: Dr. P. N. Kalla
DEE, SKRAU, Bikaner

: Dr. S. S. Nanda
DEE, OUAT, Bhubaneswar

1. Improving Production and Productivity of Field crops
Dr. J. S. Sandhu, ADG (Seeds), ICAR, New Delhi.

2. Engineering Technologies for Higher Productivity
Dr. N. P. S. Sirohi, ADG (Agril. Engg.), ICAR, New Delhi.

3. Horticultural Technologies for Higher Production, Value addition and Improved Livelihood
Dr. U. Srivastava, ADG (Horticulture), ICAR, New Delhi.

4. Best Practices and Technologies for Higher Production, Value addition and Improved Livelihood in Fisheries & Aquaculture
Dr. Madan Mohan, ADG (Marine Fisheries), ICAR, New Delhi.

TECHNICAL SESSION–4

10.00-11.30 hrs

Facilitating KVKs in Management, Administrative & Financial Matters

Chairman

: Dr. S. Ayyappan
Secretary, DARE and DG, ICAR, New Delhi

Co-Chairman

: Dr. K. D. Kokate
DDG (AE), ICAR, New Delhi

Panelists

: Shri A. C. Ghosh
Director (AE&GA), ICAR, New Delhi

: Shri Naveen Jain
Comptroller, CCSHAU, Hisar
Appendix - 1

Rapporteurs

: Dr. J.S. Urkurkar
  DES, IGKVV, Raipur

: Swami Shashankananda Maharaj Ji
  Secretary, R.K. Mission Ashrama, Ranchi

: Dr. Y.P.S. Dabas
  DEE, GBPUA&T, Pantnagar

: Dr. T. Mohapatra
  Director, CRRI, Cuttack

: Er. V. P. Kothiyal
  Director (Works), ICAR

: Dr. B.T. Rayudu
  Senior Scientist, ZPD, Zone-VIII, Bangalore

: Dr. Prem Chand
  Scientist and I/C AF&AO, Zone-VII, Jabalpur

11.30-12.00 hrs Tea Break

**TECHNICAL SESSION–5**

12.00-13.30hrs

Farm Innovations and Best Practices Developed by Farmers

**Chairman** : Dr. V.K. Taneja
  Vice Chancellor, GADVASU, Ludhiana

**Panelists**

: Dr. R.R. Hanchinal
  Vice Chancellor, UAS, Dharwad

: Dr. K.R. Dhiman
  Vice Chancellor, YSPUH &F, Solan

: Dr. O.P. Gill
  Vice Chancellor, MPUA&T, Udaipur

**Rapporteurs**

: Dr. K. Dattatri
  Principal Scientist, ZPD, Zone-V, Hyderabad

: Dr. P. P. Pal
  Senior Scientist, ZPD, Zone-II, Kolkatta

Programme Schedule
1. Water Chestnut based Farming System Model for Higher Income through Processing and Value Addition  
   *Shri Vilas Tijare*, Sconi (Madhya Pradesh)

2. Technology Integration in Dairying - Managing from Farm to Fork  
   *Shri Kishore Tulasiram Kate*, Baramati, Pune (Maharashtra)

3. Protected Cultivation of Fruits and Vegetables in Hills  
   *Shri Tara Dutt Karakwal*, Champawat (Uttarakhand)

4. Diversifying Farm Enterprises for Sustainable Small Farm Households  
   *Shri Dev Narain Patel*, Lucknow (Uttar Pradesh)

5. Innovative Vegetable Seed Production  
   *Shri Jagtar Singh Brar*, Bathinda (Punjab)

6. Innovative Diversified Farming  
   *Shri Kushal Pal Sirohi*, Kaithal (Haryana)

7. Diversified Farming System with Horticulture Crops  
   *Major Manmohan Singh*, Amritsar (Punjab)

8. Innovative Ways of Developing Livelihood of Tribal Farmers and Farmwomen  
   *Smt. Jaya Devi*, Munger (Bihar)

9. Motivating Farmers for Taking up Community Farming for Economic and Overall Livelihood Development  
   *Shri Nawal Kishor Nath Sabade*, Lohardaga (Jharkhand)

10. Tractor Drawn Compressor Spray Pump  
    *Shri Nayan Pal Shivran*, Jaipur (Rajasthan)

11. Modified Puddler and Leveller  
    *Shri Piyusbhai Ambalal Patel*, Kheda (Gujarat)

12. Tricycle Weeder – An Innovation  
    *Shri Nagalingappa Manappa Badiger*, Dharwad (Karnataka)

13. Identification of Medicinal Value and Processing of Indian Trumpet Flower  
    (*Oroxyllum indicum*)  
    *Mrs. Rose Mary Rymmai*, Ri-bhoi (Meghalaya)

14. Water Harvesting & Women Empowerment in Nicra Village  
    *Shri Sant Kumar Sinha*, Jehanabad, Bihar

15. Wheat Variety Baba Vishwanatha of BHU  
    *Shri Chandrashekar Singh*, Varanasi, U.P.

13.30-14.30hrs  Lunch Break


SPECIAL SESSION

14.30-18.00 hrs

Programming Mind for Success and Unleashing Human Potential for Higher Productivity

Chairman : Dr. R. R. Hanchinal
Vice Chancellor, UAS, Dharwad

Speaker : Shri Sunil Parekh
M.D, Rise Development Academy, Mumbai

Rapporteur : Dr. V.P. Chahal
Principal Scientist (AE), ICAR
New Delhi

18.00-18.30 Tea Break

TECHNICAL SESSION–6

18.30-20.30hrs

ICT Mediated Best Practices in Knowledge Empowerment of Farmers

Chairman : Dr. K. D. Kokate
DDG (AE), ICAR, New Delhi

Rapporteurs : Dr. P. Adhiguru
Senior Scientist, ICAR, New Delhi

Dr. A.K. Singha
Senior Scientist, ZPD, Zone III, Barapani

   Mr. Rikin Gandhi, Chief Executive Officer, Digital Green, New Delhi

2. Role of ICT in Knowledge Empowerment of Farmers - Way Forward for KVKs
   Dr. G. Dileepkumar, Principal Scientist/Global Leader, Knowledge Sharing and Innovation, ICRISAT, Hyderabad

Programme Schedule
3. ICT and Remote Sensing Applications in Disaster Management in Agriculture
   Dr. M.V.R. Seshasai, Group Head, AS&AG, NRSC, Hyderabad

4. mKRISHI
   Dr. Arun Pande, TCS Innovation, Lab Mumbai

5. Best Practices of IFFCO Kisan Sanchar Ltd. in Technological Empowerment of Farmers
   Mr. S. Srinivasan, CEO, IFFCO Kisan Sanchar Ltd.

20.30-21.30 hrs Dinner

TECHNICAL SESSION–7

Day 3 (November 22, 2012) 09.00-11.15 hrs

Integration of Best Practices and Technologies under NICRA-Project

Chairman : Dr. A.K. Singh
Vice Chancellor, RVSKVV Gwalior

Panelists
: Dr. A.M. Narula
ZPD, Zone – I, Ludhiana

: Dr. A.K. Singh
ZPD, Zone – II, Kolkatta

: Dr. N. Sudhakar
ZPD, Zone-V, Hyderabad

: Dr. Y.V. Singh
ZPD, Zone-VI, Jodhpur

: Dr. Anupam Mishra
ZPD, Zone-VII, Jabalpur

: Dr. Srinivasa Rao
Principal Scientist CRIDA, Hyderabad

Rapporteurs
: Dr. C.V. Sairam
Principal Scientist, ZPD, Zone-VIII

: Dr. S.R.K. Singh
Senior Scientist, ZPD Zone-VII
Appendix - 1

1. Consolidating the Gains of NICRA Project-Lessons for Up-scaling
   Dr. Srinivas Rao, Principal Scientist, CRIDA, Hyderabad

2. KVK Experiences in Promotion of Climate Resilient Technologies (presentation by 11 KVKs) viz; KVK Tumkur (Hirehelli), Karnataka, KVK Namakkal, Tamilnadu, KVK Baramati, Pune, Maharashtra, KVK Satna, Madhya Pradesh, KVK Datia, Madhya Pradesh, KVK, Gumla, Jharkhand, KVK Nimpith, West Bengal, KVK Dhubri, Assam, KVK Uttara Kashi, Uttrakhand, KVK Kullu, Himachal Pradesh, KVK Bharatpur, Rajasthan

11.15-11.30 Tea Break

**TECHNICAL SESSION–8**

11.30-13.30 hrs

Technological Backstopping and Harnessing Synergy of Working in Partnership Mode

*Chairman*: Dr. K.R. Dhiman  
Vice Chancellor, YSPUH&F, Solan

*Co-Chairman*: Dr. V.V. Sadamate  
Principal Consultant, FAO India Office, New Delhi

*Panelists*: Dr. N. Nadaraja  
Director, IIPR, Kanpur

Dr. A. K. Singh  
ZPD, Zone IV, Kanpur

Dr. R. Prashad  
Advisor, (R&D), Dhanuka Agritech Ltd., New Delhi

*Rapporteurs*: Dr. S.K. Roy  
Senior Scientist, ZPD, Zone-II, Kolkata

Dr. Keshava  
Senior Scientist, ZPD, Zone-I, Ludhiana
Presentations:

1. Transforming Farming into Agro-entrepreneurship: A Case of Banana Tissue Culture
   *Dr. Sanket Thakur*, B-32, Shriram Vihar, Purena, Raipur

2. Experiences of Working in Partnership for Crop Management
   *Dr. R. Parshad*, Advisor (R&D), Dhanuka Agritech Ltd., New Delhi

3. Technological Backstopping of KVKs for Harnessing Pulse Productivity—Experiences of IIPR
   *Dr. N. Nadarajan*, Director, IIPR, Kanpur

4. Technological Backstopping of KVKs—Experiences from Andhra Pradesh
   *Dr. Gidda Reddy*, DEE, ANGRAU, Rajendranagar, Hyderabad

5. Technological Backstopping of KVKs—Experiences from Rajasthan
   *Dr. Inderjeet Mathur*, DEE, MPUA&T, Udaipur

6. Technological Backstopping of KVKs—Experiences from Jharkhand
   *Dr. R.P.S. Ratan*, DEE, BAU, Ranchi

7. Backstopping of KVKs for Technology Management, Business Planning & Development—Experiences of ICAR
   *Dr. C.N. Ravishankar*, ZTM & BPD unit, CIFT, Cochin

8. Scientifically Integrated Herbal Solutions for Enhanced Livestock Health Index and Profit of Farmers—Experiences of Ayurvet
   *Dr. Anup Kalra*, CEO, Ayurvet Limited

9. PPP Experiences of United Phosphates Ltd.
   *Dr. Vinayak Sharma*, Integrated Business, UPL

10. Mahindra Kisan Samridhi Programmes and Approaches
    *Shri Harshvardhan Nawathe*, Mahindra & Mahindra Ltd

11. “Sunhera Kal”— A KVK-JCB Unique Collaboration Bringing Progressive Difference in Rural India
    *Shri Puneet Vidyarthi*, GM & Head, Rural JCB India Ltd., Ballabgarh

12. Innovation: An integrated approach by Falcon Garden Tools Limited
    *Miss Rasleen Duo*, Falcon Garden Tools Limited

13.30-14.30hrs                        Lunch Break
### VALEDICTORY SESSION

**Day-3 (November 22, 2012)**  
14.30-15.35hrs

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| 14.35-14.40 hrs | Welcome Address                    | Dr. A. M. Narula  
              |                                    | Zonal Project Director, Zone-I,  
              |                                    | Ludhiana          |
| 14.40-15.00 hrs | Remarks and Recommendations        | Dr. K. D. Kokate  
              |                                    | DDG (AE), ICAR, New Delhi  |
| 15.00-15.20 hrs | Address by Chief Guest             | Dr. Gurbachan Singh  
              |                                    | Chairman, ASRB, New Delhi  |
| 15.20-15.25 hrs | Concluding Remarks                 | Dr. B. S. Dhillon  
              |                                    | Vice Chancellor, PAU, Ludhiana  |
| 15.25-15.30 hrs | Vote of Thanks                     | Dr. V. Venkatasubramanian  
              |                                    | ADG (AE), ICAR, New Delhi  
              |                                    | Dr. M.S. Gill, DEE, PAU, Ludhiana  |

**Rapporteurs**  
- Dr. V.P. Chahal, Principal Scientist (AE), ICAR  
- Dr. N. Girdhar, Senior Scientist (AE), ICAR
Inaugural Address by
Shri Sharad Pawar, Hon’ble Union Minister of Agriculture and Food Processing Industries, Government of India

My colleague Minister of State, Dr Charan Das Mahant; Dr. S. Ayyappan, Secretary, DARE and DG, ICAR; Dr. B.S. Dhillon, Vice-chancellor, Punjab Agricultural University; Dr. K.D. Kokate, DDG (Agricultural Extension); Heads of NGOs; senior officials from Government of India, Government of Punjab, ICAR and Agricultural Universities; Scientists, Programme Coordinators, members from press and media, ladies and gentlemen.

It is indeed my proud privilege to be with you consecutively 7th time on the occasion of the Inaugural function of KVK Conference. My greetings to the KVK family and NARS fraternity. Let me first congratulate PAU on celebrating its Golden Jubilee year and willingly shouldering the responsibility of hosting the 7th National Conference on KVK at its campus. My heartiest congratulations to the KVKs for winning the National and Zonal KVK awards. I appreciate all these KVKs for their dedicated good work and services rendered to the farming community.

I am also impressed by the world class infrastructure, learning ambience and high traditions of research, education and technology transfer activities of the PAU. Founded in 1962, it is the second oldest among the SAUs with a glorious history behind it in espousing the cause of farming community. Since its establishment, the University has always been a focal point of several new scientific discoveries including more than 700 crop varieties and hybrids and other innovations which triggered green revolution and rapid agricultural transformation in the country. PAU deserves all appreciation for its critical role in increasing agricultural production of Punjab, which with only 4.2 million ha cultivated area is contributing substantially wheat and rice towards central food reserves of the country.

PAU was first to win the ICAR Best Institution award and also first SAU which got a special Grant of Rs. 100 crore from the Central Government. It is gratifying to note that PAU scientists have received 3 Padma Bhushan, 10 Padma Shree awards and 91 other different awards from various scientific bodies including ICAR and CSIR. Ladies and gentlemen, let us give a big applause to this seat of learning.

I am delighted to share with you that during 2011-12, the production of major food crops like rice, wheat, coarse cereals and pulses was at record levels. We produced 257.44 million tonnes foodgrains. Similarly, we harvested a record production of 357.7 million tonnes of sugarcane, 35.2 million bales of cotton and over 30 million tonnes oilseeds during the year. The efforts of our farmers, scientists and State Goverments for these
sterling achievements are really commendable. Despite some odds, we expect good harvest this year also.

At present, with a production of 121.8 million tonnes of milk, India is the largest producer of milk in the world. But demand for milk is projected at 150 million tonnes by the end of twelfth plan. Therefore, Government has recently launched the first phase of National Dairy Plan (NDP), which is being implemented by National Dairy Development Board. The NDP aims at increase in milk production in 14 major milk producing States and greater access of farmers to the organized milk processing sector. In order to optimize and harvest the returns from livestock, poultry, and fisheries sector, there is need to focus on bridging yield gaps by enhancing productivity of smallholder farmers engaged in livestock and fisheries.

Our endeavor in the twelfth plan should be to consolidate the gains of various mega schemes and gear up to enhance the growth rate of agriculture to 4% as compared to 3.3% achieved in the eleventh plan.

In the coming years, we would need to produce more fruits and vegetables and protein rich products such as eggs, fish and meat. The demand for these products is expected to grow substantially with rising incomes and changing dietary habits and preferences of our population. Therefore, we have to pursue a multi-pronged strategy which seeks to boost productivity and production through product-specific interventions.

In view of the need to step up investment in agriculture sector, Government has allowed FDI for development of seed and other inputs, post-harvest processing and management infrastructure, and multi brand trading of farm commodities. This would benefit all stakeholders across the entire value and supply chain. Farmers will benefit with significant reduction in post-harvest losses and better prices, while consumer will gain from lower prices, greater choice and better quality.

The challenges that Indian agriculture faces in the coming years remain enormous. Still we continue to depend on imports for pulses and edible oils. Ensuring food and nutritional security and eliminating hunger, including hidden hunger, is a high national priority. Secondly, climate change has emerged as a major challenge to our agriculture. The immediate problems that our farmers face relate to intra-seasonal variability of rainfall, extreme hot and cold weather pattern and unseasonal rains. These aberrations cause heavy losses to our crops every year.

It is, therefore, an urgent necessity to speed up our efforts to develop climate-resilient crop varieties, cropping patterns and management practices. I am very optimistic and happy to see that the NICRA project of ICAR has evolved and demonstrated successfully climate resilient technologies on farmers field through 100 KVKs. Besides, the newly established National Institute on Abiotic Stress Management has started its research programmes on such emerging problems. The Government has also approved for
Establishment of two institutes namely Indian Institute of Agro- Biotechnology at Raipur and National Institute of Biotic Stress Management in Ranchi under ICAR to deal with future challenges.

Special attention needs to be paid to the role of women in the farm sector. Women have historically been the source of traditional and tacit knowledge. Thus special efforts have to be made to make the entire R&D chain more gender-sensitive and give priority to technological options that reduce the drudgery of women working on the farm and home. ICAR has already taken a lead in this direction. I think the First Global Conference on Women in Agriculture, organized in New Delhi during March this year, has set an agenda world over for bringing transformation in their lives.

Dear Delegates, we must never lose sight of the fact that our main client is the Indian farmer. Unless we engage with farmers and their problems, we will not succeed in transforming new knowledge into higher productivity and better income for farmers. We must get our research and extension questions primarily from them. I am happy to know that the ICAR is in the process of putting in place robust mechanisms to strengthen interaction between scientists and farmers through Farmer FIRST Project and also to ensure better convergence between research and extension systems.

The role of front-line extension education programmes of KVKs, especially of technology application in field, are most crucial for the farmers to realize the gains from technological innovations. From scientists’ point of view, it is important to see that the technology reaches the end user at right time and in right manner. The simple purpose for which the KVK designed is helping farmers to help themselves by relating technologies to their farming situations, needs and perspectives.

I suggest KVKs to develop technology specific extension models keeping in view the requirements of agro-eco-systems and socio-economic conditions of farmers based on ‘Demand Driven Approach’ instead of Supply Driven Approach’. In future, the KVKs will have to focus on quality extension advisory interventions like ISO certification and Good Agricultural Practices in collaboration with Public and Private extension service providers. Besides, the feedback mechanism is to be strengthened and its effective use for improving public extension delivery at grass root level must also be ensured. ICAR may propose such mechanisms and convergence approaches for funding under National Mission on Agricultural Extension and Technology.

The bulk of small, marginal and resource poor farmers urgently need hand holding and assured subsidized timely quality farm inputs from certified and trustworthy suppliers, besides most efficient irrigation techniques and unintrupted supply of electric power. For such farmers, KVK may create new models of technology delivery based on cooperatives and principles of group dynamics to convert their small subsistence farms into small agro-entreprises.
I am happy to know that KVKs are working in partnership mode with innovative farmers to harness their potential to create awareness on technological innovations among other fellow farmers. Such interventions, if followed with missionary zeal, have tremendous potential to get transformed other regions of the Country into grainaries like Punjab and Haryana.

KVKs must prioritize technologies and best practices centric to resource poor farmers not only to enable them to take advantage of new technologies which can increase their farm production but also to reduce the drudgery in farming and improving the input use efficiency. The underline principle should be to minimize input cost and maximize farm output and helping them to organize themselves for mutual benefits. Such an approach could certainly make difference in their life and livelihood.

I exhort all KVKs to work in a mission mode and converge their efforts to make Indian farmers proud of their profession. I once again congratulate all the awardee KVKs for their excellent performance. My greetings to all of you and wish you good luck in your endeavours and success of the Conference.

Thank You.

Jai Hind