हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch

Agritech Interventions
Harbingers of Prosperity

2010

भाकृअनुप
ICAR

Division of Agricultural Extension
Indian Council of Agricultural Research
New Delhi 110 012

www.icar.org.in

प्रतिभा देवीसिंह पाटिल
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सत्यमेव जयते

राष्ट्रपति
भारत गणतंत्र

PRESIDENT
REPUBLIC OF INDIA

Message

I am happy to learn that the Indian Council of Agricultural Research (ICAR) is organizing a National Conference on Krishi Vigyan Kendras (KVKs) 2010 on December 22, 2010 at Udaipur and bringing out a document on "Agritech Interventions-Harbingers of Prosperity-2010".

Agriculture plays a significant role in addressing poverty, hunger, malnutrition and livelihood security of millions of people in India. Since independence, the country has made significant strides in agriculture, to meet the growing demands of our growing population. The ICAR as an apex body that caters to the needs of Agricultural Research, Education and Extension in the country undertakes action as well as policy based empirical research in the field of agricultural sciences. It also promotes ecologically sustainable agriculture and has established a wide network of Krishi Vigyan Kendras (KVKs), under the umbrella of ICAR Institutes.

On this occasion, I extend my warm greetings and felicitations to the organizers and the participants and all those associated with the Council and wish the Conference every success.

Pratibha Patil

(PRATIBHA DEVISINGH PATIL)

New Delhi
December 14, 2010

शरद पवार
SHARAD PAWAR

कृषि, उपभोक्ता मामले
खाद्य और सार्वजनिक वितरण मंत्री
भारत सरकार

MINISTER OF AGRICULTURE & CONSUMER AFFAIRS
FOOD & PUBLIC DISTRIBUTION
GOVERNMENT OF INDIA

Message

Indian Council of Agricultural Research (ICAR) plays a major role to ensure the country's food security and farmer's prosperity. In spite of varying climatic conditions, declining farm resources, the country could achieve higher production especially in food grains due to hard working Indian farmers as well as the strenuous efforts of National Agricultural Research System and the concerned Public and Private agencies.

Many scientific technologies go un- noticed by the farming community due to lack of awareness. In order to overcome this problem, the ICAR is disseminating various agricultral technologies through its large network of Krishi Vigayan Kendras (KVKs) across the country.

I am happy to note that the ICAR has identified and complied various success stories as well as case studies of KVKs for the benefit of other farmers in the country. The publication entitled '**Agritech Interventions–Harbingers of Prosperity 2010**' has several useful and easily adoptable technologies through which agricultural production can be sustained.

I am sure this publication would be useful for the scientists, extension personnel, policy makers and also for Indian farming community especially for upscaling of these successful technological interventions.

I congratulate the ICAR for taking all efforts to document this valuable information

New Delhi
December 9, 2010

(SHARAD PAWAR)

प्रो. के.वी. थॉमस
PROF. K.V. THOMAS

कृषि, उपभोक्ता मामले
खाद्य और सार्वजनिक वितरण राज्य मंत्री, भारत सरकार
नई दिल्ली

MINISTER OF STATE FOR AGRICULTURE
CONSUMER AFFAIRS, FOOD & PUBLIC DISTRIBUTION
GOVERNMENT OF INDIA
NEW DELHI

Message

Sustainable growth in agriculture and its allied sectors is a major challenge for global and Indian agriculture. Technologies emerging out of reserach and their dissemination to the farmers with the help of Development Departments and Infrastructural Institutions would continue to be the major strategy for increasing agricultural production in the country.

Indian Council of Agricultural Research (ICAR) is the fulcrum of research activities in agriculture and its allied sectors. As an integral part of ICAR, Krishi Vigyan Kendras (KVKs) function as knowledge and Resource Centres of farm technologies. There are 589 KVKs in the country which play a major role in fostering the growth of agriculture through technological backstopping.

In order to upscale some of the successful technologies emerged through the interventions of KVKs, the Division of Agricultural Extension of ICAR has brought out a publication entitled '**Agritech interventions – Harbingers of Prosperity 2010**'. The publication contains details of successful technologies made by the KVKs under varied agro- climatic conditions that can be replicated where similar conditions exists. I am sure that this publication would be of immense use to Indian farmers, researchers, planners and policy makers.

I congratulate ICAR and all the contributors who are responsible for bringing out such valuable and useful publication.

New Delhi
December 9, 2010

(PROF. K.V. THOMAS)

डा. एस. अय्यप्पन
सचिव एवं महानिदेशक
DR S. AYYAPPAN
SECRETARY AND DIRECTOR GENERAL

भारत सरकार
कृषि अनुसंधान और शिक्षा विभाग एवं
भारतीय कृषि अनुसंधान परिषद्
कृषि मंत्रालय, कृषि भवन, नई दिल्ली

GOVERNMENT OF INDIA
DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION
AND
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
MINISTRY OF AGRICULTURE, KRISHI BHAWAN
NEW DELHI

Foreword

Research and Development efforts since sixties have brought the agricultural production to a level of self sufficiency in the country. However, Indian agriculture exhibits a fluctuating trend in recent past mainly due to the changing trends of monsoon. The country's total food grain production was 234.47 million tonnes during 2008-09 which has slipped to 218.19 million tonnes during 2009-10 due to drought like situations in the country.

In view of this, Indian agricultre has multi-faceted challenges in the form of declining productivity of land, labour and water. In spite of declining resoures, technologies continue to play a mjaor role in achieving sustainable production in agriculture and allied sectors. Therefore the National Agricultural Resarch System has to focus on Farmer's First- to provide them Profit and Prestige through Partnership.

The wide network of KVKs of ICAR across the country aims at the assessment, refinement and demonistration of location specific technology modules in agriculture and its allied enterprises. The technologicfal modules demonstated by the KVKs would focus on the agriculture prosperity at district in particular and meeting the future demand of farm products both at state and national level.

At the right time, the Division of Agriculttrual Extension of ICAR has brought out a publication entitled 'Agritech Interventions – Harbingers of Prosperity 2010' which contains the impact of inspiring interventions in agriculture and its allied sectors. I am sure that this publication would be useful to Indian farmers and all the concerned in the National Agricultrual Reserach System and other Development Departments and Infrastructural Institutions.

I cogratulate Division of Agricultural Extension for thier effors in bringing out this document.

(S. AYYAPPAN)

New Delhi
December 6, 2010

डा. कि.द. कोकाटे
उप महानिदेशक (कृषि विस्तार)
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कृषि अनुसंधान भवन I, पूसा, नई दिल्ली
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
KRISHI ANUSANDHAN BHAWAN I
PUSA, NEW DELHI

Preface

Technology is the base for increasing agricultural productivity and production. In this direction, the Indian Council of Agricultral Research (ICAR) is playing a pivotal role in the generation of need based agricultral technologies and improving the quality of agricultural education as well as extension towards knowledge based advancements in agriculture and allied sectors.

Our responsibilities have increased manifold due to alarming climate change, scarcity of irrigation water, complexity of farming systems and global food crisis. In view of this, the ICAR has created a network of Krishi Vigyan Kendras across the country for assessment, refinement and demonstration of technology at micro situation. Besides, the KVKs at district level are providing effective technological backstopping and advisory through need based interventions. As a testimony, efforts have been made to identify successful interventions of KVKs which are motivating and encouraging other farmers across the country. These experiences are documented in the form of present publication entitled 'Agritech Interventions – Harbingers of Prosperity 2010'. This publication includes 101 inspiring technological interventions that can be emulated by other farmers where similar micro-agro-ecosystems exist.

In this context, I appreciate the efforts made by all Zonal Project Directors, the Director of DRWA, all Programme Coordinators of respective KVKs and my colleagues at the Division for bringing out this publication. I am sure that this publication could certainly serve as reference to policy makers, researches, extension personnel, farmers and agri-preneures.

(K.D. KOKATE)

New Delhi
December 5, 2010

Editorial Board

The document entitled, 'Agritech Interventions-Harbingers of Prosperity-2010' portrays the 101 Success Stories of farmers who have adopted and taken advantage of the technologies provided by KVKs across the Country. Their contributions are duly acknowledged.

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PHT AND VALUE ADDITION

ENTREPRENEURSHIP DEVELOPMENT

INTRODUCTION

The National Agricultural Research System (NARS) is playing a pivotal role in enabling food security by continuous generation of technologies in agriculture and allied sectors in the country. The Indian farming mostly characterized with diversified agro-ecologies, water scarcity, unpredicted rains due to vagaries of monsoon and high cost of technological inputs. Based on the changing scenario of agriculture year by year, It requires promotion of proper management of natural resources like soil, water and micro environment, besides wellbeing of all stakeholder involved in the food production and consumption chain. This is primarly possible by technological empowerment of farmers.

As part of such a strategy, the Indian Council of Agricultural Research (ICAR) is playing a crucial role in providing technologies generated by NARS after its assessment, refinement, demonstration in the micro farming situations, in addition to updating the knowledge and skill of farmers and extension personnel by taking up innovative approaches through its network of 589 Krishi Vigyan Kendras (KVKs), which act as knowledge and resource centres for empowering all the partners in the agricultural development process.

Over the years, there is a change in agrarian structure, though 80% of farmers are operating small and marginal land holdings and having a weak access to critical production resources. It is expected that India will have the largest agricultural manpower dominated by youths under 30 years of age by 2020. Majority of the Indian youth live in villages and are engaged in agricultural activities. Keeping in view such a situation, the KVKs are effectively addressing the felt needs of farming community especially rural youth by following plough to plate approach and creating an enterprising environment. In order to reach the farmers efficiently, a number of activities are carried out by the entire KVK system to bring out location specific technology modules and appropriate extension approaches. It is therefore very important to review and analyze the input, output, outcome and impact of technological interventions implemented by KVKs by documenting the success achieved and to reorient the strategies for effective functioning of KVKs for fulfilling its mandate.

In this direction, the Division of Agricultural Extension of ICAR has made a critical review of success stories emerged from KVKs through a rigorous process followed by the Programme Coordinators at district level, the Zonal Project Directorates at Zonal level and by the Division at national level. Alltogether 101 salient technological interventions which proved success have been chosen as a testimony of hard work put in by KVK system and are presented in the form of this document.

There is no denying the fact that until the full potential of technology modules tested and demonstrated by KVKs are harvested by the millions of farmers in the country, success cannot be truly translated into production gains at the field level. It is hoped that this attempt may direct the KVKs and the farming community for up-scaling and replication of successful enterprising interventions for teaching the untaught and reaching the unreached.

CROP IMPROVEMENT

Timely Seed Supply Enhanced Farmers Income

KVK Shimoga, Karnataka

Groundnut and rice productivity in Shimoga district is low due to non availability of quality seeds at right time. KVK Shimoga established seed villages through farmers participatory seed production in association with National Seed Project (NSP) of University of Agricultural Sciences, Bangalore. Pogramme was initiated in groundnut crop during summer 2003 by MOU with farmers to assure them about buy back agreement. According to MOU the selected farmers have to purchase nucleus seeds from NSP by paying Rs 4000/q. KVK imparted technical know-how and do-how through training among farmers and provided regular technical seed production guidance through field visits from time to time. Steps taken to maintain the purity of seed are (i) procured breeder seed from ARS, Honnavile, (ii) provided quality foundation seed to selected farmers, (iii) isolation distance maintained, (iv) timely roughing done and (v) provided seed certification by State Seed Certifying Agency. At the end, NSP purchased graded pods as per MOU.

It was attracted by farmers and area on groundnut seed production was extended to 10 ha during summer 2004. Seed production programme was then extended to rice crop during summer 2005 in an area of 50 ha and produced 2200 q of rice seeds of varieties viz., Jaya, Jyothi and MTU – 1001. Seed production of groundnut started with 2 ha in 2003 which increased to 52 ha at present, where as rice seed production increased from 50 ha in 2005 to 883 ha at present. Due to timely availability of quality seeds of rice, area sown expanded to 39622 ha. Due to seed production of groundnut and rice, additional net profit gained by the farmers was Rs 30000/ha and Rs 4625 to 7281/ha in different varieties of rice, respectively. Looking at the results, Government of India recognized Bullapura village as Seed Village during 2006 and supported with various facilities like paying Rs150/q of quality seed as an incentive to farmers who produce seeds. So far, farmers participatory seed production was established in 19 villages viz., Bullapura, Bedarahosahalli, Hanaswadi, Agasanahalli, Siriyur, Holehanasawadi, Barandur, Navile, Purale, Jayanthigrama, Dhadumghatta, Thimlapura, Hasudi, Honnavile, Belalkatte, Basavapura, Harobenavalli, Melinahanasawadi and Goravinakatte wherein 82 farmers involved in *kharif* and 43 farmers in *rabi.* Karnataka State Seed Corporation has taken up seed processing and marketing where as seed procurement and supply to farmers is being done by Department of Agriculture, Shimoga.

Salient Features

- Farmers have selected suitable varieties
- Farmers were made aware of about susceptible and resistant varieties towards specific pests and diseases
- Avoided 25-30% pest and disease incidence
- Farmers were learned about post harvest management
- Ensured timely supply of quality seeds
- Small farmers also participated in seed production

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Early Autumn Rice Cheers Farmers

KVK Nalbari, Assam

As flood is a regular phenomenon in Sungarbori village on the bank of Brahmaputra river in Nalbari district of Assam, there is no/less scope for cultivating winter/summer rice and hence farmers opted to grow *autumn* rice variety Jaya, which being a long duration crop, also was uncertain on account of flash floods, coupled with higher cultivation costs. To address both these issues, KVK Nalbari motivated and trained group of farmers for cultivating high yielding and short duration early *Ahu* rice (early *autumn* rice) variety Luit, developed by Assam Agricultural University, which is deemed to be compatible with the physical and socio-cultural and economic condition of the area. During 2006, trained group of farmers under the leadership of Shri Shahjahan Ali, cultivated the rice variety Luit in 32 ha under the technical guidance of KVK and could get a yield of 5-6 t/ha. During 2007, Shri Ali could supply 100 q of Luit seed to the Agriculture Department when a severe flood compelled the Department to procure and supply seeds of post flood short duration rice variety as an emergent relief measure to those farmers whose standing rice crop was lost in the flood. Luit being a short duration variety up to 110 days, it fits into their system avoiding the flood season till harvest, coupled with other positives such as lower irrigation and labour demand and good yield with better average net return than the traditionally cultivated variety of Jaya which was frequently destroyed by the recurring floods.

Salient Features

- Introduced short duration of 100 days early autumn rice variety Luit developed by Assam Agricultural University
- Rice variety Luit escaped flood and gave assured yield than traditionally cultivated Jaya rice variety
- Lower irrigation and labour demand of Luit variety, hence better profitability
- Rice variety Luit occupied an area of 1000 ha by 2009, replacing the less favourable and uncertain option of Jaya variety

The small and marginal farmers of the area suddenly see an assured livelihood option before them and the area under the variety Luit gradually expanded to 71 ha, 139 ha and 1000 ha during 2007, 2008 and 2009 in different pockets of the block, subdivision and finally the district, respectively, through the technology backstopping of KVK. Luit completely replaced Jaya in Barkhetri development block of the district which is a recurring flood hit area.

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Red Kernel Rice-Revati Succeeded

KVK North Goa, Goa

In Goa, rice is an important staple cereal crop and being grown in an area of 52801 ha with the production of 255974 t annually and productivity of 35.32q/ha. Productivity is major constraint due to use of poor quality seed, shattering habit in existing variety Jyoti resulting in less profitability. However, local preference for red kernel rice varaiety Jyoti is being traditionally cultivated in the state. With this background. During 2007-08, KVK North Goa, ICAR Research Complex for Goa introduced red kernel rice varariety Revati released by Regional Rice Research Station, Moncompu, Kerala, in village Dhulapi located 6 km from KVK. Revati not only is better yielder (43.4q/ha) but also non shattering which ultimately results in higher yield. Further there was no incidence of leaf folder, case worm and diseases like, bacterial blight and blast were noticed .It has spread in the village covering an area of over 8.0 ha besides spreading over more than 150 ha across the district within a span of 5 years substituting existing variety Jyoti and partial substitution of Jaya which were ruling earlier. Farmers grew Revati on an average of 0.1 ha per family in many cases. Expenditure incurred was Rs16500/ha and realised Rs 31750 as gross income with a net profit of Rs 15250/ha.

Revati has made farm families to increase their production and productivity per unit area. Farmers Club of Chorao got double the income through organic cultivation of the variety and adopting post harvest techniques like milling, packaging and branding by under the guidance of KVK. Chief Volunteer of the club was recently received an honour in this regard. With achieving these results, State Agricultural Department, Government of Goa included Revati under state rice minikit programme. Variety has spread in both the districts of North and South Goa and covered approximately more than 500 ha. Pre and post assessments indicated that the main factors such as low yield and shattering habit have been overcome by Revati and ultimately increased the yield of 33.1%.

Salient Features

- Revati variety of red kernel rice yielded 43.4q/ha as against existing yield of 32.69q/ha and gave a net profit of Rs 15250/ha
- Revati is non shattering type variety resulting in additional grain yield of approximately 10-11q/ha
- Introduced variety Revati meets the local preference for red kernel as well as raw and parboiled rice
- Enhanced head rice recovery due to bold grain

Smt Jyoti Dhulapkar(0832-2285513), Dhulapi-Goa, Mrs Geeta Gajanan Uscaikar (9921207514), Pandav wada- Chodan, Shri Darryl Pereira (9823074888), Saligao, Shri Candido Dias (9922728707), Taleigao are few among the successful farmers who are acting as contact farmers to fellow farmers in the district. KVK is continuously supporting farmers for imparting appropriate technical knowledge and arranging quality and timely seed.

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Ragi Rewarded Farmers

KVK Tumkur, Karnataka

Ragi (*Eleusina coracana* L.) is main staple crop of Tumkur district and is cultivated in 1.2 lakh ha. However, its cultivation declined in the district in recent years owing to low productivity due to non-availability of quality seeds, poor management and scanty rainfall. At this situation, KVK Tumkur introduced high yielding ragi variety MR-6, which was released in 2004 by University of Agricultural Sciences, Bangalore, through an empowerment approach called as Appreciative Planning and Action (APA). It has six stages and each stage has distinctly different activities indicated by 6 D's viz., Discovery, Dream, Design, Delivery, Do it now and Discuss/Dialogue. With this approach, 10 ha area was brought under cultivation by MR-6 variety in 2005-06 followed by 80 ha in 2006-07, 125 ha in 2007-08, 350 ha in 2008-09 and now it occupied 525 ha through two seasons June-October as *Kharif* and January-February as summer in the district. Farmers gained a net income of Rs 22000 with Benefit Cost Ratio of 2.5 with ragi variety MR-6 under the technical guidance and monitoring of KVK.

It is noteworthy that one of the farmers Shri Malleshaiah from C.N. Halli taluq created a landmark in the history of ragi cultivation accounting 38.70 q/ha under rainfed condition followed by other farmers viz., Shri B.T. Kariyappa from C.N. Halli taluq, Shri M.Thimmappa from Turuvekere taluq, Shri H.R. Suresh, Shri D.C. Chikkabasappa from Tiptur taluq produced recordable yields of ragi 26.51, 35.51, 35.30 and 36.92 q/ha, respectively, for which they all got certificate of hounour from the Department of Agriculture, Tumkur. Shri Thimmaiah, Shri Kariyappa, Shri Siddalingaiah and Shri Mallesh were some of the interested farmers actively engaged in the process of disseminating the technology as master trainers and sold seed materials to their neighbours at doorstep.

Salient Features

- KVK empowered farmers through Appreciative Planning and Action
- Introduced ragi variety MR-6 which is more suitable for early sowing
- Achieved adoption of ragi variety MR-6 that gave 10-15% more yield as compared to MR-1, MR-2 and GPU-28
- Produced high quantity and quality of fodder through ragi variety MR-6 as compared to other varieties

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Maize Cultivation Changed Tribals Livelihood

KVK Bastar, Chhattisgarh

Bastar Plateau is having good agro climatic situation for maize production but the productivity of maize in the district is 1800 kg/ha. Local varieties, imbalance use of fertilizer, high incidence of insects, pests and diseases, poor management of soil, low fertility, unawareness of improved technology are the major problems associated with low productivity of maize in Bastar district. Keeping these problems in view, KVK Baster introduced improved varieties such as 30 R 77, 4643, Hycel for *kharif*, 30V92, 900M for *rabi* and 30V92, 900M, 4212 for *zaid* along with complete package of practices like proper spacing, and seed rate, sowing time, fertilizer application etc. Shri Sonuram from Jarebendri village of the district, a trainee of KVK adopted improved varieties of maize in his 1.0 ha of land and earned a net income of Rs 15840 in *kharif*, Rs 10850 in *rabi* and Rs 9453 in *zaid* seasons in a year. Further, productivity of maize has increased from 15.90 q/ha to 20.65 q/ha in farmers fields during the period from 2004-05 to 2008-09.

On the basis of last six years interventions in Bastar district by KVK, adoption of hybrids with full package of practices has been proved more beneficial than local practices for getting high returns per unit area under rainfed situation. Demonstrated technology has increased the average yield about 131.08 % over local varieties and practices. Since dissemination of technology, adoption of improved varieties of maize spread in 24715 ha and gave 444870 q maize production and Rs 373.69 lakh income in the district. Tribal farmers convinced with technology and adopting in a large scale. Technology has generated additional manpower of 384040 man days in the district. Technology has raised the standard of living by changing the skill and attitudes of the farmers from their traditional cultivation practices towards commercial production. This level of production meeting its growing demand for human food, animal and poultry feed as well as for industrial processing by the wet and dry millers to produce value added products with the present available technology.

Salient Features

- Introduced improved varieties along with complete package of practices including proper spacing and seed rate, sowing time, fertilizer application etc.
- Increased the average yield about 131.08 % over local practices
- Increased 24715 ha area with improved varieties of maize and produced 444870 q maize production in the district
- Generated additional employment of 384040 man days

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Groundnut Occupied River Bank Fallow Lands

KVK West Tripura, Tripura

In West Tripura district, requirement of groundnut is about 237 MT and to satisfy this demand, more than 250 ha is to be brought under groundnut considering average productivity of 950 kg/ha. Considering the importance, KVK West Tripura introduced HYV of groundnut ICGS-76 through FLD in few pockets of West Tripura district in 2008-2009.

Initially the programme was started with Sanghita Self Help Group consisting of 10 members. Owing to satisfactory performance and wide adaptability in the sandy soil of river bank of Samruchara, it was adopted by 32 farmers from six adjacent villages in the next *kharif* season in their fallow lands. Later they were trained on seed production of groundnut and they are being producing 1.0 t of seeds per season. Seed is being sold to the NGOs, Government Departments, private seed farms and fellow farmers of different villages.

Salient Features

- Used fallow land
- Followed latest cultivation practices
- Reduced tikka disease due to seed treatment
- Achieved optimum productivity and production
- Planned for seed production at farmers level
- Created awareness and provided technical support for adoption of groundnut in large scale in the district

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Pure Bt. Cotton Seeds Brought Smile among Farmers

KVK Kheda, Gujarat

Bt. cotton raised through buying seed from local market was highly affected by *Heliothis, Spodoptera* and leaf curl virus in Gothak Lat village of Kheda district. This had resulted into low yield of cotton. Disgusted farmers shown their crop to KVK experts of Kheda. They noticed mixed type population with low flower formation and dropping of balls due to purchasing of poor quality seed from local market. This necessitated awareness campaign on Bt. cotton in the village and also villages of Kheda district.

KVK Kheda conducted demonstrations on pure Bt. cotton (VICH-15) in 40 ha belonging to 50 farmers of 4 villages under Technology Mission on Cotton Mini Mission-II during 2007-08. Arranged methyl parathion 2% dust for control of mealy bug, micro nutrient (MgSO4 and $FeSO_4$) and neem based bio-pesticides as critical inputs to farmers. Demonstrations were laid out with pure Bt. cotton seed along with Bt. cotton seed purchased from local market as control plot. Farmers were guided on micro nutrient and bio-pesticide application from time to time by KVK. Pure Bt. cotton seed crop produced an average yield of 42.0 q/ha whereas locally purchased Bt. cotton seed crop could produce only 15.75 q/ha.

Salient Features

- Bt. Cotton seed purchased in local market provided low yield due to mixed plant stand vulnerable to insect pest infestation
- Farmers obtained 162 % more yield by pure Bt. cotton (VICH-15) over control and gained 94 % more income
- Most of the area in Kheda district is under Bt. cotton now
- Technology improved socio-economic status of cotton growers in Kheda district

Cultivation of pure Bt. cotton under recommended package of practices provided a net profit of Rs 73500/ha, while it was just Rs 25000 in case of Bt. cotton grown with local seed. Farmers were highly convinced with pure Bt. cotton seed. Now many farmers in district Kheda have started cultivation of cotton with pure Bt. cotton seed under technical guidance of KVK, which has changed socio-economic conditions of cotton growers in Kheda district.

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Frenchbean Fetched Higher Profits

KVK Bangalore Rural, Karnataka

In Karnataka, frenchbean is cultivated in 9567 ha with the production of 106111 t annually. Rust and bacterial blight are the major diseases of frenchbean with which farmers loose profits every year. French bean variety Arka Anoop, not only better yielder but also resistant to rust and bacterial blight, released by Indian Institute of Horticultural Research, Bangalore was introduced by KVK Bangalore Rural during 2007-08 in the village Antrahalli, Doddaballapura taluk has fetched more returns to the farmers. Arka Anoop spread over 80 ha across the district within a short span of 2 years substituting local varieties and partial substitution of Arka Komal which was ruling earlier. Farmers grew Arka Anoop on an average of 0.4 ha per family in many cases. Expenditure incurred was Rs 72500/ha and realised Rs 222500 as gross income with a net profit of Rs 150000.

Arka Anoop has made farm families to increase their purchasing capacity as well as they could send their children to schools by paying their prescribed fee comfortably. Lot of behavioural changes such as confidence in the farming was achieved. Pre and post assessments indicated that the main factors such as resistant to diseases like rust and bacterial blight thereby reduced cost of cultivation in addition higher yields compared to other varieties contributed to the successful adoption of variety Arka Anoop from zero to 30%.

Salient Features

- Arka Anoop yielded 14 t/ha as against existing yield of 11.09 t/ha
- Gave net profit of Rs 1.5 lakh/ha
- Arka Anoop is a leguminous vegetable and suitable for crop rotation
- Requires less seed rate @45 kg/ha as compared to 50 kg/ha for other varieties
- Farmers obtained 30% more income
- Arka Anoop spread horizontally with around 80 ha

Smt Chennamma (09343766673) from Antrahalli village, Shri Siddalingachar (09242733386) from Antrahalli village, Shri Subramani (09972076865) from Hadonahalli village of Doddaballapura taluk in Bangalore Rural District are few among the successful farmers who are acting as contact farmers to fellow farmers in the district. KVK is supporting farmers not only by providing appropriate technical knowledge but also arranging quality and timely seeds.

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Bengalgram Productivity Boosted with Variety JG-11

KVK Kurnool, Andhra Pradesh

In Andhra Pradesh, bengalgram is grown in 6.07 lakh ha with production of 8.57 lakh tones and productivity of 1437Kg/ha. In Kurnool district, bengalgram occupies 2.43 lakh ha (40 % of area in the state). It is mostly cultivated in vertisols under residual soil moisture regime with mono-cropping system in southern parts of the district covering Koilkuntla, Uyyalawada, Sanjamala, Dornipadu, Panyam and other mandals. KVK Kurnool introduced improved variety of bengalgram JG-11 in 2004 through organization of 16 training courses and 114 demonstrations. KVK also took up seed production programme at its farm and also procured seed from FLD farmers in seed chain programme and arranged 250q seed to other KVKs in the state as well as to farmers in the district and neighboring districts viz., Anantapur and Kadapa.

JG-11 along with agronomic practices like seed treatment with *Trichoderma viridae*, balanced fertilization etc., gave an increase in yield up to 22.9 % against existing local variety Annegiri under rainfed situations and up to 14 % under protective irrigation with an average yield of 20.75q/ha and 29.37q/ha, respectively. In a span of 5 years (2004-08), there was 100% replacement of local variety (Annegiri) in Kalugotla village of Koilakuntla mandal by JG-11. At present the area under JG-11 in Kurnool district is about 2.18 lakh ha.

Salient Features

- KVK introduced improved bengal gram variety JG-11 in 2004
- JG-11 characterized with purple stem, large leaflets, semi spreading with profuse branching, 36 cm plant height, 55 pods per plant, 100 seed wt 22.5 to 24 gms, matures in 97 days and tolerant to wilt as well drought
- JG-11 has large pod size and seeds are very bold with light brown and smooth
- JG-11 is being cultivated in 2.18 lakh ha in Kurnool district of Andhra Pradesh
- JG-11 boosted the productivity of bengal gram by 22.9% in rainfed situations and 14% under protective irrigation
- Achieved 100% bengalgram cultivation in Kalugotla village of Koilakuntla mandal byJG-11

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Tissue Culture Banana Plantation- A Boon

KVK Harda, Madhya Pradesh

Harda district in central Madhya Pradesh has acquired the tag of Mini Punjab due to bumper wheat production for the past few years coupled with Soybean as cash crop during monsoon season. Economy of the area has grown rapidly, but there is a dark side to this new prosperity. Mono cropping is slowly but surely making farmers of this area overly dependent on these two crops. Alert and educated farmers here are slowly realizing this situation and are opting for alternative cropping patterns.

With this background, KVK Harda introduced tissue culture banana through a series of activities. Shri Upendra Gadre (07573-230182) belonging to Timarni village of Harda district adopted tissue culture banana since 2005. He is cultivating banana as a cash crop for last five years and his experience has been very satisfactory. He planted tissue culture banana using drip irrigation. He is using tissue culture plants instead of traditional root shoot plants as they are more uniform in size and quality. He says tissue culture plants cost a bit more than traditional shoot plants, but in long run it is economically more viable. Though ground water is ample in the area, he is still using drip irrigation instead of flood irrigation as he saves expenditure and manpower by using drip irrigation system.

Salient Features

- Introduced tissue culture banana
- Observed uniformity in plant height and quality
- Banana plantation made soil porous and improved soaking quality
- Field crops were grown as filler crops
- Provided net annual income of Rs 192500
- Drip irrigation saved expenditure and manpower

After meeting the total cost of Rs 240000 of which Rs180000 in first year and Rs 60000 in second year, he got a net income of Rs 385000 during two years i.e. Rs. 192500 per annum. Banana plantation makes soil porous and the water soaking quality also improves. After 4 years of banana cultivation, he cultivated wheat and soybean in one of the banana fields last year and the results were more satisfactory.

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Perseverance Paid Farmer

KVK Ri-Bhoi, Meghalaya

KVK Ri-Bhoi introduced improved varieties of turmeric (RCT-1), ginger (Nadia), soybean (JS-335) and groundnut (ICGS-76) through frontline demonstrations in 2007. Organized a field day and showed the performance of these improved varieties to farmers and extension personnel.

Time and tides wait for none, this proverb holds good for Shri Francis of Bangla village in Umsning block. He was basically a ginger cultivator like any other Meghalaya farmer. Shri Francis adopted the varieties introduced by KVK besides other vegetable crops under the technical guidance of KVK. Consequently he raised his income from Rs 8000 to Rs 20000 per month.

Then, he never kept his land of 3.0 ha uncultivated like other fellow farmers. He has also modified his pig unit scientifically with the intervention of KVK. With the financial assistance from NABARD and technical support of KVK, Jalkund has been constructed in his field and he is utilizing the water for irrigating winter vegetables. He maintains harmonious relationship with his fellow farmers as well as officials and has visionary plan for intensifying agriculture and allied sectors in his farm.

Salient Features

- Obtained 30% increased yield of turmeric and ginger through improved varieties (RTC-1, Nadia)
- Introduced HYV of soybean (JS335) and groundnut (ICGS-76)
- Life saving irrigation to winter vegetables with the help of stored water in 30000 l capacity Jalkund
- Technical interventions increased 40% of monthly income of farmer

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Fodder Raising make Dairy Farmers Rich

KVK Vellore, Tamil Nadu

Majority of dairy farmers in Vellore district were small and marginal. They are depending on external source of feed which is readily available in the form of mixtures in market that lead to high maintenance cost and earns low income from dairy farming. With this background, KVK Vellore introduced Cumbu Napier Hybrid Fodder (Co (CN)4) grass during 2007-08. Special features of Co (CN)4 are profuse tillers of 25-30/clump, non lodging, ultra soft juicy stem (3.4 % brix), more leaf stem ratio, free from pest and diseases and superior rationing ability.

KVK conducted a series of activities for about 2 years continuously which includes organization of both on and off campus training courses on production technologies, supply of planting material as per the demand, organization of frontline demonstrations, organization of field days, group meetings, organization of sensitization meetings and interface between scientists, extension personnel and farmers for dissemination and adoption of Co (CN)4) as a fodder among dairy farmers.

Salient Features

- Increased awareness and adoption of Co(CN)4 among the dairy farmers
- Introduced Co(CN)4 as an intercrop in coconut gardens and backyards by many dairy farmers throughout the district
- Improved knowledge, skill, decision making and socio-economic condition of dairy farmers
- Increased average milk yield from 5.5 to 7.0 l/day/ animal
- Reduced 20-30% of external feed cost

Within a short span of two years about 250 dairy farmers adopted this fodder in more than 21 ha in the district. Co (CN 4) gave a recorded yield of 340 t/ha/year with a net income of Rs 66155.

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Rainfed Farmers Gained through Annual Moringa

KVK Ahmednagar, Maharashtra

More than 90% of the area is rainfed in Ahmednagar district of Maharashtra and receives an average annual rainfall of 400 mm. Farmers are adopting mono cropping and cultivating low income crops like sorghum, pearlmillet, pulses and soybean in *Kharif* and keeping the land fallow in post rainy season due to lack of irrigation facilities. KVK Ahmednagar introduced drumstick cultivation with improved variety PKM-1 in 1996 that thrives well in dry land areas.

Besides arranging seed and seedlings of variety PKM-1 initially, 36 demonstrations and 23 training programmes (923 farmers) were conducted by KVK. One state level seminar was conducted on commercial cultivation of drumstick. KVK prepared a CD on improved drumstick cultivation. Technique of pruning was standardized for exploiting the local and distant market demand. Further, KVK printed more than 20000 folders on drumstick production technology for the information of farmers. Success story was also given in the website of KVK.

Salient Features

- Introduced drumstick variety PKM-1 which is seed propagated, annual in habit and bushy in growth, green pods with fleshy, non-fibrous and non-bitter and weighs 160 grams/pod
- Observed low incidence of insect pest and disease
- Recorded high productivity (250-350 fruits / tree / year)
- Observed long shelf life of 10-12 days at room temperature
- Adopted widely by the farmers of Maharashtra

Due to intervention of KVK, 1612 farmers adopted drumstick cultivation in an area of 1482.4 ha in Ahmednagar district in particular and 6452 farmers in 4822.2 ha in different parts of Maharashtra in general. Variety PKM-1 yielded 72-80 q/ha in farmers fields and the highest yield recorded was 110 q/ha. Net income obtained

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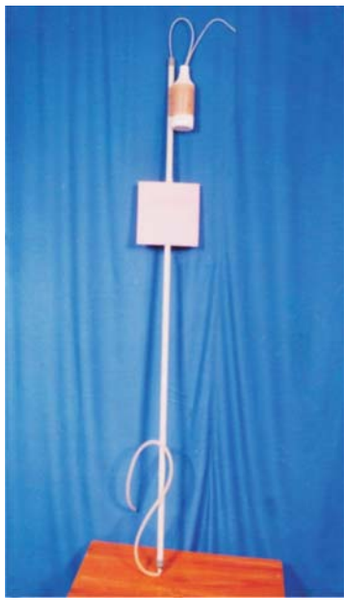
Unproductive Date Palm Paid Dividend

KVK Porbandar, Gujarat

Naturally grown date palm in village Advana of district Porbandar do not bear fruits due to no pollination. Such date palms are abundantly available in 4-5 villages around Porbandar. Shri Laxambhai Odedra visited Kutchch once and observed that farmers are producing good quality of dates from such plants in Kutchch through manual pollination technique taught by KVK located at Kutchch in Porbandar district.

He discussed the problem with KVK and obtained training on pollination technique. KVK launched awareness camps on pollination technique with the help of Shri Laxambhai in village Advana. Pollination technique was taught to farmers and they did cross pollination to their unproductive date palms with an instrument designed by KVK. It is made up of PVC pipe attached with one bottle on one end and at another end attached one rubber pipe. Fill the bottle with pollen mixed with talkcom powder and then pollinate the female flowers by blowing air through mouth. Length of instrument can be adjusted depending upon height of the plant. Farmers were highly delighted when their unproductive date palms produced quality dates in bumper quantity of 100-200 kg dates from each palm which fetched an additional income of Rs 5000 to 10000 by selling at the rate of Rs 50/kg.



Salient Features

- Unproductive date palms were made productive through manual pollination technique taught by KVK
- Each plant provided an income of Rs 5000-10000
- Farmers of Advana and other 5 villages adopted the technology and raised their income
- Nutritious dates enriched the diet of local inhabitants

Inspired by success of Shri Laxmanbhai and other farmers purchased date palm seedlings from KVK and planted on the bunds of their farms and doing intercropping also. Farmers of other 5 villages have also learnt the pollination technique and produced quality dates which improved their income. Credit goes to Shri Laxam Bhai Odedra who taught pollination technique under the awareness campaign launched in collaboration with KVK .

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CROP PRODUCTION

Group Farming Revived Rice Cultivation

KVK Kollam, Kerala

In Kollam, rice area and production was 10187 ha and 22421t in 2003-04, 8949 ha and 20646t in 2004-05, 7281 ha and 16063t in 2005-06 and 5497 ha and 12580t in 2006-07, respectively, that shows drastic decline of 46 % in area and 44 % in production. It was one side and other was existing social milieu of the district, where non availability of labour aggravated by the advent of cashew factories and their attractive pay offers. At this juncture, KVK Kollam formulated Comprehensive Rice Production Package (CRISP) and implemented in Panthaplavu, Pattazhi with a total fund outlay of Rs 1.88 lakh in 2007-08. Later it was extended to four other panchayaths of Kollam in 2008-09 and nine blocks of the district in 2009-10 with the financial outlay of Rs 2.8 lakh and Rs 3.78 lakh, respectively.

Under the technical guidance of KVK, group approach of rice cultivation was taken up in Pattazhi Panchayat of Pathanapuram block by 31 farmers in an area of 6.26 ha in r*abi* season of 2007-08 and subsequently it was increased by 71 farmers of Kareepra panchayat in Kottarakara block in 15 ha, 17 farmers of Edamulackal panchayat in Anchal block in 5 ha, 11 farmers of Perayam panchayat in Chittumala block in 3 ha, 31 farmers of Pattazhi panchayat in Pathanapuram block in 7 ha in *rabi* season of 2008-09, 16 farmers of Elampallur panchayat in Mukhathala block in 5 ha, 18 farmers of Thrikaruva panchayat in Anchalamoodu block in 5 ha, 24 farmers of Cheriyavellinallur panchayat in Chadayamangalam block in 5 ha, 55 farmers of Kareepra Panchayat in Kottarakara block in 10 ha in *kharif* season of 2009-10, 15 farmers of Edamulackal panchayat in Anchal block in 5 ha, 20 farmers of Veliyam Panchayat in Kottarakara block in 8 ha, 5 farmers of Paripally Panchayat in Ithikara block in 3 ha, 23 farmers of Pattazhi panchayat in Pathanapuram block in 5 ha in *rabi* season of 2009-10, and 43 farmers of Kadapuzha panchayat in Sasthancotta block in 12.5 ha in Summer season of 2009-10. Grain yield of rice increased from 3.0 t/ha in 2007-08 followed by 4.1 t/ha in 2008-09 and 4.8 t/ha in 2009-10. Key elements for successful increase of grain yield were community, resources, integration, sustainability and profitability. Community based management of resources such as inputs, labor, farm machinery etc as well as implementation of sowing, transplanting, intercultural operations, plant protection measures, harvesting and marketing were effectively and successfully carried out by the groups.

Salient Features

- Capacity building of farmers in group management and scientific cultivation practices
- Raised rice nursery on community basis
- Purchased plant protection chemicals in a lot for entire area
- Reduced cost of cultivation by 30% by synchronized planting and farm operations
- Proved the possibility of group farming and participatory resource management for increasing productivity of rice that revived rice cultivation

It was successfully disproved the notion that rice cultivation is non profitable. Timely input supply, technical interventions, regular field visits and confidence instilled in the farmers convinced them that rice could be re-introduced in the same glory as that of a decade before in the abandoned paddy lands.

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SRI Brings a New Horizon in Rice Cultivation

KVK East Sikkim, Sikkim

Rice is staple food of Sikkim and is second most important cereal crop of the state followed by maize. It is cultivated in an area of 14150 ha with a productivity of 1515 kg/ ha which is very meagre. This is mainly due to conventional method of rice cultivation under organic condition coupled with use of local rice cultivars like Attey (Thulo and Sano), Krishnabhog, Dudhetulsi and Dudhkante.

KVK East Sikkim introduced SRI in rice cultivation through a series of activities. KVK conducted FLD on SRI recommended by ICAR Research Complex, Sikkim Centre with local rice cultivar Attey during *kharif*, 2008-09 and 2009-10 in Rey Mindu village, Chhota Singtam and Aho villages. It was recorded an average yield of 19.1 and 23.25 q/ha during *kharif* 2008-09 and 2009-10 as compared to the check yield of 15.9 and 19.6 q/ ha, respectively, under conventional method. An increase of 20% yield was obtained with SRI on same local variety (Attey) with Benefit Cost Ratio of 2.3 wherein cost of cultivation was Rs10950/ha with a net return of Rs 25550.

Though SRI was initially objected by the farmers to be more labour intensive and apprehended to be a failure technology, but due to close supervision and monitoring of KVK, the success of SRI technology was realised by the farmers in enhancing rice productivity. Farmers adopted SRI in rice cultivation in more than 40 ha area during *Kharif*, 2010-11 in the district. Besides, State Department of FS & AD, Government of Sikkim has taken up SRI programme in several places as per the demand of farmers.

Shri Lendop Lepcha (9434153562), Shri Chumdem Lepcha (9800953960) from Rey Mindu village, Shri Gopal Podiyal (9609774562) from Chotta Singtam village, Shri Vashu Dev Bhatrai (9832005485) from Lower Aho village are few successful as well as contact farmers to fellow farmers in the district. Farmers of East Sikkim are now progressing with SRI towards making the district as rice bowl of Sikkim.

Salient Features

- SRI saved seed cost as the seed requirement is less
- Improved the soil aeration and incorporation of weed biomass in to soil
- Observed low incidence of pests and diseases as the soil is allowed to dry intermittently
- Facilitated easy to take up intercultural operation as it was planted in rows
- Gave higher yield due to profuse root system leading to high uptake of nutrients resulting in more number and vigorous productive tillers
- SRI changed the rice scenario in East Sikkim

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SRI Doubled Rice Productivity

KVK Trivandram, Kerala

Rice cultivation found to be non-profitable and area is declining day by day in Kerala due to several technical and social problems relating to rice sector. Erratic rains, non-availability and high cost of labour and high input prices are some of the major factors responsible for decline. KVK Trivandrum initiated to promote System of Rice Intensification (SRI) as a new rice production method in 2003. KVK tested SRI at farmers field for identification of local adaptability. KVK worked in collaboration with Tamil Nadu Agricultural University, Coimbatore for technical back up and supply of critical inputs for promoting SRI. As a first step, KVK selected Nellanad panchayat which is 30 km North of Trivandrum. Name of the place itself means The Land of Rice but due to high cost of cultivation and less profit from rice cultivation, area under rice was fast dwindling. Due to KVK intervention, all 66 farmers of Nellanad padasekharam (10 ha) are cultivating rice in SRI method for the past five years during *Kharif* and *rabi* crops. KVK trained over 3000 farmers and 800 extension workers of government, non-government, voluntary action groups and private agencies on SRI in several districts of Kerala and motivated hundreds of farmers to adopt the practice, without any discontinuance. Along with SRI, KVK introduced rotary marker, rotary weeder, leaf colour chart (LCC) and *Pseudomonas fluorescence* for the first time in Kerala. A total of 375 individual farmers adopted SRI in an area of 250 ha. KVK has successful in doubling the rice yield (7.0 t/ha) as compared with the state average of 3 to 3.5 t/ha. Farmers said this was the highest yield ever recorded. Elated by the unexpected bumper yield, farmers organised a harvest festival in the locality and shared their happiness and experiences.

Salient Features

- SRI saved cost of seeds, labour, chemical fertilizers and pesticides
- SRI gave double yield due to profuse tillers, icreased panicle length and grain weight
- Multiplied seeds easily and effectively by the farmers themselves
- Promoted SRI through Government of Kerala

Hon'ble Minister of Agriculture Shri Mullakkara Ratnakaran inaugurated rice cultivation with SRI at 3 ha low land fields of Poojappura central jail, Trivandram on 16th December, 2008 and Shri Ratnakaran himself participated harvest festival of the same crop. This was mooted to implement SRI in the farm of Open Jail at Nettukalthery under the technical guidance of Mitraniketan KVK.

KVK has organised series of workshops on SRI. Responses were high towards mass media programmes conducted by KVK through AIR and Doordarsan. Success of KVK for increasing rice production through SRI served as a means to develop a policy note by the Government of Kerala to promote SRI in the state. For the first time KVK SMS has bagged Karshakamitra 2004-2005 - a prestigious award of State Government of Kerala for the best extension functionary in the field of agriculture. Thus, an extension design adopted by KVK was highly successful for the promotion of SRI at different levels in Kerala.

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Remunerative Rice Cultivation through SRI

KVK Thiruvarur, Tamil Nadu

Thiruvarur district is being the major partner of rice cultivation covering nearly 35000 ha during *kharif* in Tamil Nadu. Production and productivity during *kharif* is largely varies due to uncertainty in receipt of canal water from Mettur dam. Of late, this region is facing several problems viz., uncertainty in availability of canal water and paucity of labour availability coupled with enhanced labour wages which led to rice cultivation becomes lack luster and less profitable. With this background, KVK Thiruvarur introduced SRI method of rice cultivation in the district by way of organizing training courses, OFTs, FLDs, utilization of TV and AIR, periodical follow up, exhibitions, production of video CD's, audio recording of feedbacks, writing of success stories, publishing in the dailies and journals and distribution of printed material in the form of booklets, leaflets and pamplets. Further, trainees were taken on exposure visit to the fields of successful farmers to create confidence and motivate them on SRI.

Rice productivity for the past 5 years in the district during different seasons shows increasing trend. Production was 4764 kg /ha in *Kuruvai* 2004-05 and with in 5 years (2008-09), the productivity has elevated to 7050 kg/ha. This massive increment is to the tune of 47.9% over the last 5 years. This unimaginable yield enhancement is due to expanded area under SRI and technological improvement coupled with farmers motivation. In fact, area under SRI was only 600 ha in 2004-05 and now the area under SRI expanded to 53700 ha in 2008-09. This remarkable spread achieved through the efforts of KVK as well as extension functionaries from the State Government. This improved method of rice cultivation (SRI) recorded higher grain yield which is 9.92% higher than the conventional method of transplanting with a saving of Rs 735 in seed cost, Rs 3190 in labour cost (nursery, transplanting, weeding and irrigation), Rs 300 in fertilizer cost and Rs 550 in pesticide cost per ha. Totally Rs 5000/ha could be saved in the cost of cultivation with an additional income due to increased grain yield and Benefit Cost Ratio of 2.99. In addition to the monitory benefit this method of cultivation also reduced the quantity of fertilizer and pesticide application.

Salient Features

- SRI saved water which reduced 4 irrigations over farmers practice
- SRI resulted minimum use of inputs such as seed, fertilizer and labour there by increased net profit
- SRI proved efficiency of mechanization in rice cultivation
- SRI provided farmers a remunerative returns from rice cultivation

SRI method becomes a profitable and alternate method of rice cultivation especially during the water scarcity period and more than 90% of the farmers in Amirthavalli, Chetichathiram, Melathirupalagudi, Pulavarnatham, Pandaravadai, Thirumahalam and Melanagai villages are adopting this method during *Kuruvai* season. Shri K. Meganathan, a progressive farmer of Edamelaiyur village in Needamangalam block was the pioneer in adoption of SRI in the district since 2005, now cultivating 5.6 ha of wet land under SRI only, Shri R.Kalyanasundaram, a progressive farmer of Thattaikkalpadugai of Needamangalam block is adopting SRI and machine transplanting in about 8 ha of his land and Shri S.Arunkumar, an M.B.A graduate of Neduvakottai village in Mannargudi block is now cultivating rice under SRI in his entire 34.4 ha as he convinced with the method.

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SRI Stimulated Rice Farmers

KVK Thiruvannamalai, Tamil Nadu

Despite fluctuation in rice yield and income in Thiruvannamalai district, farmers are being continuing rice cultivation as there is no suitable alternate crop to replace. Main reasons behind for low net income from rice cultivation are high seed rate, low productivity, improper nursery management, indiscriminate use of chemicals, labour shortage and high wages. At this situation, KVK Thiruvannamalai has played a major role in introduction of SRI method of rice cultivation in the district. KVK undertaken various interventions to popularize SRI among farmers. KVK conducted experiments on SRI in an area of 2.0 ha during *kharif* 2004 and harvested an yield of 8.25 t/ha. This mooted to conduct a series of experiments as well as activities by KVK both at KVK farm and farmers fields and made necessary modifications in SRI method of rice cultivation to suit local conditions like use of rotary marker for square planting, cono weeder for weed management etc. KVK conducted SRI demonstrations in 59 ha covering 105 farmers belonging to 9 villages viz., Kannamangalam, Kayanallur, Avanavadi, Kaveribakkam, Maruthadu, Jannamedu, Kavedu, Semmampadi, and S.V. Nagaram during 2005-06 to 2009-10. Further, 94 training courses were organized exclusively on SRI for 1817 farmers and extension personnel covering 178 villages in the district during 2005-06 to 2009-10. Simultaneously, conducted 1112 field visits, 1850 telephonic advisory service, 10 exposure visits to 250 farmers, distributed 2500 booklets, 4000 pamphlets and 5000 leaflets on SRI in collaboration with TNAU and other line departments in the district.

As per the record, a total of 1915 farmers of Arni block covered SRI in 1520 ha, 2100 farmers of West Arni block in 1680 ha, 2420 farmers of Vandavasi block in 1710 ha, 1350 farmers of Thellar block in 902 ha, 2352 farmers of Pernamallur block in 1110 ha, 3010 farmers of Cheyyar block in 2250 ha, 1760 farmers of Annakavoor block in 1300 ha, 2916 farmers of Vembakkam block in 2450 ha, 1820 farmers of Chetpet block in 1210 ha, 2164 farmers of Thiruvannamalai block in 1560 ha, 1990 farmers of Thurinjapuram block in 1284 ha, 2515 farmers of Kilpennathur block in 1525 ha,810 farmers of Chengam block in 510 ha, 2529 farmers of Thandarampattu block in 1616 ha, 3116 farmers of Pudupalayam block in 1915 ha, 4013 farmers of Polur block in 2916 ha, and 3323 farmers of Kalasapakkam block in 2412 ha in the district. Percentage of yield increase with rice varieties ADT 37, 43 and 45 ranged from 33.34 to 63.30 in all these blocks with a net income ranged from Rs 45700 to 52400 as compared to existing rice cultivation Rs 20680 to 31796. Thus, spread of rice cultivation with SRI method was incredible.

Salient Features

- SRI method of rice cultivation was followed by 40103 farmers of Thiruvannamalai district in 27870 ha
- Average productivity of the rice has been increased from 5.61 t/ha to 7.70 t/ha
- A total of 624 members of farmers clubs as well as SHG's have got self employment by undertaking mat nursery raising, SRI rice planting and cono weeding
- Rice cultivation has become more profitable through SRI which stimulated large number of farmers

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ICM Practices Revived Rice Cultivation

KVK Pathanamthitta, Kerala

In Pathanamthitta district, rice is cultivated in Midland, Malayoram Ecosystem and Upper Kuttanad Ecosystem. Upper Kuttanad area where mainly rice is cultivated covers 6 panchayaths that forms the part of rice bowl of Kerala. In Midland and Malayoram ecosystem lands are interspersed with alternating hills and valley where as in Upper Kuttanad area three river systems viz Achenkovil, Pampa and Manimala flow in. However, the productivity of rice was only 2.8 t/ha which is not remunerative. Major reason being rice cultivation becomes less remunerative due to high cost of cultivation forcing farmers to leave rice fields fallow for years making it difficult for revival.

With this background, KVK Pathanamthitta introduced Integrated Crop Management (ICM) practices to reduce cost of cultivation of rice. ICM practices were initially tested at Kuttor panchayath of Pulikezhu Block of Pathanamthitta district in 2007-08 by a group of 11 women SHG members. As a result,, farmers of Kuttor panchayath adopted ICM practices in 20 ha in 2008-09 under the guidance of KVK. Apart from this ICM technology was taken up in Ranny, Konny and Kulanada Panchayaths of this district in 4 ha and State Rice Seed Farm in Pullad taken up ICM cultivation in 0.4 ha by which they increased the production from 2.6 t to 5.1 t/ha. During 2009-10 to counteract labour shortage, mechanization with paddy transplanter, weeder, reaper, threasher cum winnower included in ICM technology and 1.0 ha was covered farmers of Pandalam Thekkekara with the financial assistance from Deptartment of Agriculture. Hybrid rice variety CORH-2 was on farm tested in 1ha and gave an yield of 10.2 t/ha. Farmers club sponsored by CADR-KVK with financial support from NABARD was started at Pandalam Thekkekara and collective operations was done by Padashekara Samathis of different rice cultivating areas (Padashekaram) in mechanized transplanting. There is a strong linkage with concerned line deparments for impleting ICM practices in rice in large area. In ICM, farmers were given choice of selection of suitable practices from the basket of options such as selection of locally adapted rice varieties, use of good quality seeds, practices in raising seedlings for transplanting, crop need based nutrient application, irrigation scheduling, IPM etc. there by reduced the cost of rice cultivation which resulted to revive rice cultivation from fallow lands kept years together.

Salient Features

- Brought down seed rate from 65-80 Kg/ha to 12 kg/ha in manual ICM transplanting and 30 kg/ha in mechanized transplanting
- Brought down nursery area from 1000 m^2/ha to 20m^2/ha in manual ICM and 40 m^2 in mechanized transplanting
- Used *Tricho*-cards for control of pest like leaf folder and stem borer replacing chemical pesticides application
- Reduced fertilizer application by 18- 25 %. through site specific nutrient management and Leaf Colour Chart (LCC)
- Saved irrigation water by over 50 % with practice of intermittent irrigation during the vegetative phase

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Transplanted Redgram Gave Bonus

KVK Bidar, Karnataka

Bidar district is considered as pulse bowl of Karnataka wherein pulses like blackgram, greengram, redgram and bengalgram grown in 206717 ha. Among these pulses, the share of redgram is 65642 ha. However, farmers facing with low productivity of redgram with a yield gap of 1871 kg/ha. To address this, KVK Bidar organized interface meet between farmers and KVK team wherein emerged the idea of transplanting of redgram. Then, KVK conducted trials on assessment of transplanted redgram during 2004-2006 and standardized the transplanting method of redgram. The same technology was popularized through frontline demonstrations during 2006-2007 wherein recorded an average yield of 34.8q/ha against 15.5 q/ha in check plots. From three years data of frontline demonstrations, it was found that there was 69.71% to 138% increase in yield with transplanting technology when compared to farmers practice.

Transplanted redgram started growing in Bidar district in an area of 400 ha in 2007-08 which was followed by 2000 ha in 2008-09 and 4000 ha in 2009-10 and harvested with the value of produce Rs 3.48 crore, Rs 24.94 crore and Rs 54.83 crore, respectively. Even under irrigated conditions transplanted redgram emerged as a solution for alternate crop for distressed sugarcane farmers in the district wherein they got a net profit of Rs 114500/ha with redgram as compared to Rs 60000/ha with sugarcane.

Salient Features

- Standardized seed to seed package of practices for transplanted redgram
- Transplanted method advanced sowing of redgram that minimized pod borer damage
- It enhanced deep rooting there by withstand against drought
- It saved input cost in the form of less seed rate, less plant protection etc
- Increased 2-3 fold yield due to profuse branching
- Tailor made technology for small and marginal farmers

Due to transplanted technology, living standard of redgram farmers is changing in pulse bowl of Karnataka. Shri Gurulingappa Meladoddi (09343001275) from Hudagi village, Shri Manik Deshmukh (09923439091) from Nimbur village under Humanabad taluq, Shri Chandrappa Biradar (09449138532) from Ghodampalli village under Bidar taluq, Shri Basantrao Patil (09481059785) from Ganganbeed village under Aurad taluq, Shri Gurunath Nande (09591629991) from Uraki village under Basavakalyan taluq are few successful farmers in Bidar district.Transplanting of redgram has become talk of the day and spread technology to other districts like Bagalkot, Gulbarga, Koppal, Haveri, Bijapur, Raichur, Yadgir in Karnataka and other states like Maharashtra and Andhra Pradesh. Thanks to KVK Bidar to show the hidden potentiality of redgram by way of transplanting method.

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Crop Diversification with Groundnut Gained Success

KVK South Tripura, Tripura

Upland rice crop in South Tripura district is not remunerative because of low yield ranging between 650-934 kg/ha. In the year 2006-08, KVK South Tripura introduced groundnut variety ICGV-86590 in South Takmacherra, Santirbazar, Baisnabirchar, Battali, Dudhpushkarini, Mogpushkarini etc villages through series of activities.

Two farmers namely, Shri Anand Mohan Patari of South Takmacherra and Nibaran Debnath of Dudhpushkarni village of the district cultivated groundnut variety ICGV-86590 and they harvested yield up to 300 kg from 0.16 ha. Subsequently, groundnut varieties of ICGS-76 and GG-20 were cultivated by number of farmers and they got yield up to 350 kg from 0.16 ha. They sold the produces as seed to the neighbouring villages and earned an income of Rs 10000-12000 per season from just 0.16 ha of land. In the year 2009, more than 7 q of seeds were supplied to the farmers for expansion of groundnut in the district.

Salient Features

- Introduced improved varieties of groundnut and utilized fallow upland areas
- Substantial yield increase of improved variety over local
- Use of low input and less management problems compared to rice and maize
- Created a great awareness among the farmer and groundnut is being expanded in uplands

With the introduction of groundnut along with modern agronomic practices, number of farmers and area increased from 7 to 71 ha and 1.2 to 20 ha, respectively, in 3 years (2006-2009). Average yield has gone up to 1900 kg/ha and increased in yield over local check (1200 kg/ha) which was 58.33%. At present, farmers of South Tripura are selling groundnut seeds @ Rs 35-45 per kg in the local market and earning up to Rs 66500 per ha with a Benefit Cost Ratio of 2.88.

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Pea Farmers Flourished

KVK Thoubal, Manipur

Pea cultivation, whether field or garden has not been a very successful venture in Manipur even though farmers in the state take it up on small scales. In Manipur, whether the pea is grown in field or garden, it is harvested as green pods for culinary/vegetable purpose without much profit.

KVK Thoubal introduced a very innovative method of cultivation of garden pea. Main features of this technology are wide spacing (2 x 2 ft), spare staking with GI wire and nylon thread netting and utilizing the space between two plots of pea by taking up intercrops. The method was assessed and a few modifications were made in plot orientation, fertilizer dose and method of application, giving a very high yield and Benefit Cost Ratio reaching up to 4.8. Method was demonstrated at ten different locations successfully and was popularised through different media. With an intercrop of cabbage, Benefit Cost Ratio increased to 11:1.

Seeing the success of the method, farmers adopted up to 0.5 ha individually. Shri E.Rajen Singh (9856114191) of Warakhong, Shri W.Koklei Singh (9862122089) of Wabagai, Shri K.Jayanta Singh (9856116949) of Wabagai are some of the successful farmers of Thoubal district. Shri Sapam Lukhoi Singh has taken up truthfully labelled seed production of pea to meet the increasing demand under the guidance of KVK.

Salient Features

- Used less seed
- Enabled intercropping, relay cropping, and crop rotation
- Practiced minimum tillage
- Yield advantage achieved up to 53% over farmers practice
- Adopted in large scale
- Achieved higher green pod yield with Benefit Cost Ratio of 4.8

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Soybean Replaced Drilled Rice

KVK Tapi, Gujarat

Low income from drilled rice, a staple food, due to high investment on seed, labour and non-availability of life saving irrigation resulted in un-economical farming for farmers in Tapi, Surat and Dangs districts of eastern tribal hilly region of Gujarat. KVK Tapi organized farmers-scientists interface meet wherein KVK and tribal farmers discussed the scope of diversified farming in these districts. The aim was to enhance the income of farmers by replacing drilled rice with cash crop soybean. Farmers were not aware about the improved agro techniques with respect to soybean as it is a new introduction in the tribal area.

KVK trained farmers on soybean cultivation and introduced cv GS-2 of soybean in place of drilled rice in the villages of three districts namely, Tapi, Narmada and Dangs through organization of 100 demonstrations covering 40 ha belonging to 100 farmers during 2007-08. Crop was given balanced dose of fertilizer and protected from insect pests using integrated pest management practices. Increase in income due to soybean cultivation over drilled rice ranged Rs 17000 to 20000/ ha, which was 58% higher than drilled rice crop. Soybean was also found to be replacing the dietary system of villagers due to training on protein enrichment by soybean.

Salient Features

- Less investment for labour for weeding
- Less water requirement due to deep rooting
- Saving in seed, fertilizers and pesticides
- Being leguminous crop is highly suitable crop rotation with cereals and vegetables
- Gave profit of Rs17000-20000/ha over drilled rice which was 58% more income
- Replaced 50% area of drilled rice in 3 districts

Farmers perceived that the cultivation of soybean is highly remunerative owing to less labour requirement for weeding, less investment on fertilizers and pesticides and less requirement for water in comparison to drilled rice. Inspired by the performance of crop, many farmers purchased seed from FLD farmers and replaced the drilled rice with this variety during 2008-09. It has been observed that 50% area under drilled rice has been replaced by soybean cv GS-2 by 2009-10 in these districts. The venture on crop diversification has not only improved the production but also changed the socio-economic status of tribal farmers in the hilly region.

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Profit Oriented Rice-Wheat Sequence

KVK Anantnag, Jammu & Kashmir

Traditional rice based cropping systems (rice-fallow and rice-oats) could hardly meet the minimum basic requirements of daily life of the farming families in Anantnag district. On an average, a net profit of Rs 40660 and Rs51882/ha was realized from rice-fallow and rice-oats cropping patterns, respectively. Compared to this, rice-wheat sequence gave total returns of Rs109524 with a net profit of Rs 61136/ha. Thus, an additional income of Rs 20447 and Rs 9254 could be realized with rice-wheat sequence over rice-fallow and rice-oats cropping pattern, respectively.

In order to disseminate rice-wheat sequence among farmers of the district, KVK Anantnag conducted frontline demonstrations in 18.2 ha area of 65 farmers/farmwomen during last 3 years. A total of 22 field days were also organized involving around 2000 farmers/farmwomen.

Salient Features

- Rice-wheat sequence gave an income of Rs109524 with a net profit of Rs 61136/ha
- Rice-wheat sequence gave an additional profit of Rs 20447 and Rs 9254 over rice-fallow and rice-oats cropping systems, respectively
- Increased the availability of cattle and poultry feed with rice-wheat sequence

Successful results of the demonstrations conducted on rice-wheat sequence particularly with respect to the timely maturity of wheat crop attracted other farmers of these villages to adopt this sequence. About1100 farmers from the same village and also in other villages in the vicinity have adopted rice-wheat sequence.

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Biogas Slurry Doubled Rice Productivity

KVK West Garo Hills, Meghalaya

West Garo Hills district of Meghalaya is covering about 42472 ha under rice of which *sali* paddy grown in 17354 ha with the productivity of 1.22 t/ha which is lower than national average productivity of 2.15 t/ha. However, yield gap is about 9.3 q/ha in paddy. Productivity of low land rice is very low as compared to other parts of the country due to non-application or hesitation to apply chemical fertilizers to increase the productivity of lowland rice.

KVK West Garo Hills introduced biogas slurry in *Sali* rice through a series of activities during 2006-08. Farmers obtained an average yield of 51.0 q/ha with the biogas slurry as against 28 q/ha in farmers practice. Farmers got a net return of Rs 26000/ha and Benefit Cost Ratio of 3.1 from biogas slurry + lime application against the net return of Rs 12750/ha and Benefit Cost Ratio of 2.5 in farmers practice. Shri Haradhan Mahanta (09436708122) from Puthimari village in CD block Betasing of West Garo Hills district is acting as contact farmer to fellow farmers in the district.

Salient Features

- With biogas slurry, paddy variety Aghoni bora yielded 51 q/ha against existing farmers practice yield of 28 q/ha
- Observed less insect-pest and diseases incidence
- Sustained soil fertility and environmental health
- Fetched net profit of Rs 26000/ha with Benefit Cost Ratio of 3.1

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Impact of Frenchbean Intercropping with Sugarcane

KVK Bijnor, Uttar Pradesh

Sugarcane is an important cash crop of mid western plain zone which occupies nearly 70 % of cultivated land. In district Bijnor, sugarcane has status of main crop and productivity of sugarcane in the district is 641q/ha which is very low in comparison to national average. Farmers are growing sugarcane as a sole crop over a large area and due to mono-cropping productivity and income per unit land is very low. During 2004-05, KVK Bijnor took the opportunity with an objective to increase the production, productivity, income and to reduce the risk factors of marginal and small sugarcane growing farmers and a survey was conducted to explore the possibilities of intercropping with sugarcane. It was found that some of the marginal and small farmers were growing frenchbean in small pockets with the low productivity. Main constraints of low productivity were old variety, improper fertilization and indiscriminative plant protection measures. Then, KVK introduced inter cropping of sugarcane with frenchbean on interested farmers fields to disseminate this system among the farmers. They were trained at KVK on different aspects of intercropping, IPM, fertilizer management, varietal importance and economics.

Due to the extensive efforts and guidance of KVK, farmers are taking keen interest in sugarcane + frenchbean intercropping. Now they are very well aware about synergistic effect of intercropping system. They are growing frenchbean without additional supply of fertilizer. Plant protection measures and weed management practices applied for frenchbean has direct impact on sugarcane yield.

Farmers are selling their intercrop produce in the mandis of Naziabadad, Kotdwar, Haridwar and Dehradun. Farmers from 6 villages have adopted this system and area under sugarcane + frenchbean system is gradually increasing from 0.8 ha in 2004-05 to 24.8 ha in 2008-09. Similarly, productivity of frenchbean also increased from 90 q/ha (2004-05) to 140 q/ha (2008-09) with an increase in net income from Rs 13750/ha in 2004-05 to Rs 48500/ha in 2008-09. Thus, the area and productivity under sugarcane + frenchbean system is increasing year by year.

Salient Features

- KVK introduced frenchbean as an inter crop in sugarcane
- Frontline demonstrations on sugarcane + french bean intercropping were conducted
- Area and productivity under sugarcane + frenchbean system is increased there by increased net income of the farmers

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Precision Farming Pride for Farmers

KVK Puducherry, Puducherry

KVK Puducherry introduced precision farming through a series of activities. Shri Batcha , a farmer of village Pandasozhanallur, Nettapakkam Commune, Puducherry adopted precision farming in his farm under the technical backstopping of KVK. As a first step, KVK enrolled him as a beneficiary under Puducherry Precision Farming Project during 2008. Then he was technically guided in establishing the drip and fertigation structures at 100% subsidy by the Government of Puducherry.

He cultivated brinjal with precision farming technology. He used the brinjal seedlings raised in protrays obtained from Hitech Nursery at Madagadipet. He raised the crop in an area of 0.8 ha during September 2008 and harvested 150 MT of Brinjal up to March 2009. The farmer could get a gross income to the tune of Rs 12 lakh within six months by selling produce. He used brinjal varieties Koyembedu/ Panrutti which fetches an appreciable price in the market. Convinced by the success of the technology he has expanded the area further to another 1.00 ha with brinjal variety Ujjala and raised the crop during October 2009. Though the crop suffered during the initial period of two months with incessant rains the farmer could manage to obtain 45 MT of brinjal up to May 2010 and could get a gross income of Rs 4.75 Lakh.

Salient Features

- Introduced precision farming in Puducherry with 100% financial support from the Government of Puducherry
- Shri Batcha successfully adopted the precision farming and cultivated brinjal crop by seedlings raised in protrays
- Within six months, Shri Batcha obtained a gross income of Rs 14 lakh from 0.8 ha land under precision farming
- Precision farming created employment to rural women

Interesting to note that his only son Shri Jayaprakash an IT professional who was working at Chennai has moved from Chennai to Puducherry to assist his father in farming as he is confident that precision farming undertaken with appropriate market tie-up will be more remunerative than IT industry. Farmer has keen to organize his fellow farmers into a group farming Puducherry Precision Farming Farmers Association for which he remains as the President. He shares his experiences as a resources person in meetings organized by KVK for the benefit of the fellow farmers.

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Relay Cropping Pleased Vegetable Growers

KVK Saharanpur, Uttar Pradesh

Shri Sethpal Singh a young farmer of village Nandifirozpur, block Baliakheri of district Saharanpur has set an example of intensive vegetable production technology. Shri Sethpal Singh has 4 brothers, out of them three are government servants and one Shri Ram Kumar assists him in farming. Shri Singh has 5.5 ha land and he mainly cultivates rice, wheat and sugarcane. Shri Sethpal Singh saw a television programme where a farmer successfully cultivated Singhara in a field which has 2.5 feet height bund all around. After that Shri Sethpal Singh visited KVK Saharanpur and discussed about its feasibility.

Under the KVK guidance, Shri Singh divided his field of 1.0 ha in three parts and after filling the water in 2.5 feet bunded fields, seedlings of Singhara were sown at right places. He put the Singhara seedlings during May so that he could sell in the market during November to June. Quality of Singhara was excellent because of clean and quality water. From one 1.0 ha area, a net profit of Rs 110000 was obtained in 5-6 months.

After harvesting of Singhara, water was drained out and biomass was ploughed in the field which increased the fertility level of field. Fenugreek was sown during last week of January which was harvested green during March with a net profit of Rs 53000. After that the field was divided in two equal parts where french bean and lobia were sown in first week of April on raised bed and green pods were harvested during June which gave a net profit of Rs 56000. Meanwhile in the month of February bitter gourd seeds were sown in polythene bags and then transplanted on raised beds where lobia and french bean were sown. For bitter gourd plants stacking was done in the field at a cost of Rs 25000 with the help of bamboo and plastic wires.

Salient Features

- Singhara was cultivar in a field which had 2/5 feet height bund all around
- Within a short span of 2 years, a net profit of Rs 353300 was obtained by relay cropping system of vegetable (singhara – fenugreek – french bean + lobia – bitter gourd – bottle gourd – spinach)
- Adopted intensive vegetable cultivation by the farmers as they pleased the profits from a piece of land

Bitter gourd started fruiting from June to mid September with a net profit of Rs 38500. During August, bottle gourd was planted which gave fruits from October to December with a net profit of Rs 77000. During January first week spinach was sown in the field and harvested green during February/March with a net profit of Rs 52000.

By relay cropping system of vegetable (singhara – fenugreek – french bean + lobia – bitter gourd – bottle gourd – spinach) a net profit of Rs 353300 was obtained in two years which was higher than rice – wheat – sugarcane rotation under traditional cultivation. Shri Sethpal Singh has 15 vermicomposting units which he fully utilizes in vegetable crops. Quality of vegetable is such that whole sellers book the vegetables in advance on premium price. Whole process of cultivation was under taken under close supervision of KVK. About 50 farmers have adopted the intensive vegetable cultivation after motivation by visiting the field of Shri Sethpal Singh.

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Production Practices Promoted Tomato Productivity

KVK Chirang, Assam

Md. Sukur Ali is a middle aged resident of Alengmari village of Bijni sub division of newly formed Chirang district who took up agriculture as his profession and livelihood long back. Agriculture and horticulture were the major components of his farming system. Major portion of his area is medium in situation, therefore, he preferred rice cultivation during *kharif* season as rainfed followed by *rabi* crops such as toria, lentil, tomato, brinjal, cole crops etc . Although, he got involved with various agricultural activities throughout the year, he could hardly manage to fulfill his family needs from agriculture. He was not well aware of HYVs and scientific methods of cultivation which debarred him from adopting new technologies as well rainfed farming situation also contributed to lower crop yield.

It was in 2008, that a newly established KVK, Bongaigaon (Chirang) entered into his village for transfer of agricultural technologies and identified Md Sukur Ali as one of its beneficiary for various demonstrations and training programmes. He was trained in new technologies such as nursery management, land preparation, transplanting, fertility management, weed management, pest management etc of various field and vegetable crops and provided with all necessary technical guidance. Tomato is an important vegetable crop of his locality grown during winter season. Although, high yielding varieties and improved crop management practices were introduced in his area, however, moisture stress condition at different stages of crop growth often leads to lower crop yield. Knowledge on irrigation water application is not sufficient as some farmers apply irrigation without considering critical stages, methods as well as depth of irrigation. Considering the necessity of water application in tomato, he adopted irrigation management in 1.0 ha during 2008-09 under the guidance of KVK. He paid full attention to tomato crop and harvested an yield of 600 q/ha which resulting 23% higher yield than conventional practice and earned a net profit of Rs 256542/ha against Rs 203292 with conventional practice. This has created awareness among the farmers of Alengmari village as how important irrigation at critical stages of crop growth and depth of irrigation. Md Sukur Ali is now a happy man with a secured future through agriculture and also becomes an inspiration for many farmers.

Salient Features

- Tomato variety Avinash 2 yielded 600 q/ha under recommended irrigation management practice against 487.5 q/ha under conventional crop
- Application of 6 cm irrigation water at 10-12 days interval to maintain required soil moisture status resulted in 23% higher yield than the conventional practice
- Gave a net profit of Rs 256542 per ha with Benefit Cost Ratio of 6.9

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Potato Productivity Enhanced by Contract Farming

KVK Dhubri, Assam

Dhubri district of Assam has tremendous potential for potato cultivation due to favourable soil and climatic conditions. But farmers are not getting remuneration from potato cultivation because of unorganized production as well as marketing system. Under such situation, KVK Dhubri introduced Contract Farming Programme (CFP) in 2007- 08 in collaboration with state- based Contract Farming Company (CFC), financial institution SBI and 3000 selected potato growers targeting a production system of about 400 ha. KVK provided the technical input and guided for the development of a operational business model to fulfill the interest of all stakeholders. Notably, during that year, occurrence of a market glut created a situation of distress sale of potato. But, contract farmers got rid of adversity by dint of buy-back arrangement with a pre-determined price @ Rs 4000/t and it has clearly shown the advantage that farmers got through contract farming.

Contract farming experience motivated farmers further to work in groups for gaining collective strength. As a result of which, potato crop exhibited horizontal spread accompanied by intensification of cold storage activities by farmers groups in 2008-09. In continuation, KVK has trained enthusiastic young farmers on seed production of potato using TPS technology in 2009-10. After a successful harvest, TPS growers opted for cold storage of TPS tuber lets to be used as seed material in next season.

Salient Features

- Promotion of the concept of contract farming
- CFP provided better availability of production inputs at farm, minimization of market risk and assurance of farm income
- Opened avenues for potato seed production
- Developed rural agri-entrepreneurship and rural agri- business hub
- Mobilized higher credit flow to agriculture

Established Agri-clinic and Agri-service Centres in the villages under the technical guidance and support of CFC. Besides, group activity comprehensively oriented the different stakeholders to the elements of organized farming for assured reaping of benefits. Contract Farming Programme amply demonstrated its role in improving the rural livelihood with minimization of risk and opened up avenues for transforming farmers to become entrepreneurs. Such attempts could be of paramount significance to the resource-poor farmers of North Eastern India for stabilizing their occupation with agriculture.

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Crop Diversification Uphold Livelihood Security

KVK Jaunpur, Uttar Pradesh

Shri Akhand Pratap Singh who belonged to a middle class family living in village Dugaulikala of Badlapur block in Jaunpur district of Uttar Pradesh, owns only 1.0 ha cultivated land for farming, through which he can fulfill his family needs. He basically follows traditional cropping system i.e. maize-wheat-pigeonpea. Through this system, he was unable to get desired income for livelihood and for education of his children. Shri Singh participated in different training programmes of KVK Jaunpur and adopted diversified farming from *kharif,* 2007. As a first step, he started transplanting of green chilli in 0.2 ha along with traditional farming in *kharif*, 2007. As a result, he got an yield of 18 q green chilli with a net profit of Rs 34000. In next *kharif* , 2008, he cultivated chilli (0.4 ha), maize (0.4 ha) and pigeonpea (0.2 ha). Further, after harvesting maize plot, half of the plot was grown by hybrid tomato (0.2 ha) and rest half area (0.2 ha) was cultivated by wheat. Similarly, final picking of chilli was followed by cucurbits (0.4 ha) in *zaid* in chilli plot. Pigeonpea field was covered through out the year. Usually farmer could earn a net profit of Rs 23200 only by using traditional farming (maize-wheat, pigeonpea) in one cropping year, while he gained a net profit of Rs 124500 from same piece of land by crop diversification.

Farmer has kept a crossbred cow for milk production and few bee boxes for honey production as per guidance given by KVK. By observing such a success and prosperity achieved by Shri Singh, other farmers motivated and came into contact with KVK. Looking the interest and curiosity among farmers of near by villages, KVK organized training courses and group discussions in villages for providing information regarding new technologies to enhance the production and economics as well as to ensure better livelihood of the small and marginal farmers of the area. Under the leadership of Shri Singh, 5 Self Help Groups were formed with 81 members from 5 villages. In *kharif* , 2009, 72 farmers started the planting of chilli variety K.A.2 in 19 ha. Similarly, hybrid tomato was planned in 8.0 ha by 42 farmers in October after harvesting of *kharif* maize. Thus, KVK has created significant impact on crop diversification among farmers.

Salient Features

- KVK motivated farmers for the adoption of crop diversification
- Farmers included vegetables in their traditional faming as diversified crops to increase their income and ensure livelihood security
- Net profit of Rs 124500/ha by using crop diversification
- Five Self Help Groups were formed with 81 members from 5 villages and doing farming with crop diversification

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Tensiometer Saved Irrigation Water

KVK Sangrur, Punjab

Successful production of rice needs more water than any other crop. Scientists of Punjab Agricultural University tried to develop suitable irrigation methods as well as to quantify the amount of water to be applied to rice crop for saving precious nature's gift. Method of irrigation in rice was refined by applying water in rice field two days after complete percolation of water which resulted in 34% saving of water. They were successful in saving 20% more water in rice with the help of Tensiometer. It is a simple instrument consisting of ceramic cup, transparent tube and gauge. Ceramic cup having small holes is attached with the gauge with the help of transparent tube and filled with distilled water. Before fitting the Tensiometer in the soil, make a 15-20 cm deep hole in the soil with the help of a tube of similar dimensions. Put the soil solution in the hole and insert Tensiometer in the hole so that the ceramic cup should be deep in the solution. Soil solution is put in hole to avoid infiltration of water from the cup. To know the suction in soil, the gauge is read after sun rise in the morning and water is applied to crop only after reading is 150 cm. When water level in the tube decreases below 2 cm, it is again filled with distilled water. For the convenience of farmers to easily read instrument, two coloured strips are used instead of a gauge. If the water inside small tube remains in green strip then there is no need of irrigation to rice and it is needed only when its level goes down to yellow strip.

Salient Features

- Tensiometer saves 15-20% irrigation water with intermittent irrigation at interval of 2 days without any adverse effect on crop yield
- Tensiometer technology is simple to use and convinced farmers to adopt in large scale
- Achieved water conservation by use of Tensiometer technology especially in rice crop

KVK Sangrur disseminated tensiometer technology in different districts of Punjab through organisation of training programmes on Tensiometer for farmers, farm women, rural youth and extension personnel during the last four years. Further, organized demonstrations on this technology at farmers fields. Effort of KVK and development departments have shown the positive change among farmers and they are practicing Tensiometer technology realizing the concern of water saving especially in rice crop due to depleting water table year by year.

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Regulated Irrigation Boosted Toria Yield

KVK Chirang, Assam

Toria is most important oilseed crop of Bijni sub division of newly formed Chirang district grown during winter season. Although, high yielding varieties and improved crop management practices of toria were introduced in the area, however, moisture stress condition at the later stages of crop growth often leads to unfilled siliqua and poor crop yield. This problem is further aggravated due to late sowing of crop as most of the farmers cultivate toria crop after harvesting of long duration rice varieties. Knowledge on irrigation water application is not sufficient as some farmers apply irrigation without considering critical stages as well as depth of irrigation.

KVK Bongaigaon (Chirang) introduced irrigation management in toria by organization of demonstrations in farmers field. It has created awareness among the farmers of Matiapara village as how important irrigation at critical stages of toria. Shri Parimal Mahapatra adopted irrigation management in toria during 2007-08 under the technical guidance of KVK. He harvested a crop yield of 13q/ha with irrigation management technology resulting 35% higher yield than conventional practice and earned a net profit of Rs 24753/ha against Rs15300 with conventional practice. In fact, he is a middle aged resident of Matiapara village of Bijni sub division of newly formed Chirang district who took up agriculture as his profession and livelihood few years back. Agriculture and horticulture were major components of his farming system. Major portion of his area is medium in situation, therefore, he preferred rice cultivation during *kharif* season as rainfed followed by *rabi* crops such as toria, tomato, brinjal, cole crops etc . He also cultivated summer vegetables and summer blackgram in some parts of upland. Although, he got involved with various agricultural activities throughout the year, he could hardly manage to fulfill his family needs from agriculture few years back. Now he is a happy farmer with a secured future through agriculture and also becomes an inspiration for many farmers.

Salient Features

- Toria variety TS-36 yielded 13.5 q/ha under recommended irrigation management practice against 10 q/ha under conventional crop
- One irrigation (6 cm) at silqua development stage resulted in 35% higher yield than the conventional practice
- Gave a net profit of Rs 24753/ha with Benefit Cost Ratio of 2.92

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Management Enhanced Productivity of Orange Orchards

KVK South Sikkim, Sikkim

Orange (Sikkim mandarin) is one of the most important cash crops of Sikkim. Area under orange in the state is 6298 ha with production of 1662 MT and productivity of 1664 kg/ha and that of South Sikkim is 925 ha with production of 1.740 q and productivity of 1881 kg/ha. From this data one can easily make out that the climate of South Sikkim is very favorable for orange cultivation. However, most of the orchards are becoming old and senile due to poor management, diseases and pest.

KVK South Sikkim carried out programme on management of orange orchards in Turuk village in South Sikkim. About 25 farmers covering 15 ha of orchards were taken as OFTs. Programme started right after the harvest of crop. Farmers were given training-cum-demonstration on training and pruning of the orchard and application of organic manure and organic fertilizers. Farmers were trained in making Cow Pat Pit (CPP) for pasting the trunk of the orange trees. Main problem in the reduction of yield was due to fruit dropping which is caused by fruit flies. Farmers were provided with pruning saw for cutting disease and dieback twigs and branches. For the control of fruit flies and white grubs, 4 pheromone traps were hung in between 100 trees. Further, 25 light traps were kept in the village near the orchards for the control of white grubs. After 1 year it was observed that most of the plants turned healthy and bearing of fruits were more and fruit dropping was minimized. Total cost of management for 15 ha of orchard comes to Rs 427000 including all inputs and labour and achieved a net return of Rs 2000000 which shows that there was a drastic increase in the yield.

Salient Features

- Management of old and senile orchards through pruning of dieback branches
- Application of CPP paste on the tree trunk
- Controlling stem borer by blocking the holes with kerosene
- Hanging of pheromone and light traps in the middle of orchard for the control of fruit flies

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Rejuvenated Khasi Mandarin Orchards by Prodcution Technologies

KVK Tinsukia, Assam

Tinsukia district is situated in prime zone for production of Khasi mandarin. Amongst the various districts of North East India, Tinsukia district produces the highest quantity of Khasi mandarin having largest area under it. Khasi mandarin is very famous for its superior quality. However, it became a major concern due to sharp progressive decline in production and area under Khasi mandarin during the last few years in the district.

KVK Tinsukia imparted training on production technologies of Khasi mandarin to the farmers from 4 divisions of the district. Farmers were adopted production technologies including the crop protection measures developed by Citrus Research Station, Assam Agricultural University, Tinsukia in their declining Khasi mandarin orchards. As a result, reduced pest and diseases, improved plant health and increased yield of the declining Khasi mandarin orchards. Farmers got 25 % more yield due to adoption of production technologies. Khasi mandarin growers rejuvenated their Khasi mandarin orchards and raised the income to the tune of Rs 22500 to Rs 30000/ha. Recent survey report of the State Agriculture Department revealed that there was a record increase of over 20% area under Khasi mandarin in the district during the last five years.

Salient Features

- Pruning, training and cleaning to remove unwanted, diseased and pest infected branches and parasitic plants
- Correction of soil pH by applying lime and proper nutrient management
- Management of *Phytophthora* foot rot by soil drenching and spraying of tree trunk
- Smearing of tree trunk up to one meter from the ground level by the mixture of 50 ml Endosulfan + 2 kg lime in 10 liters of water
- Average yield increased in rejuvenated orchards by 25 %

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Tuberose Women Empowered

KVK Mysore, Karnataka

In Mysore district, tuberose is grown as a major flower crop in 1100 ha. Out of which 95 % of the area occupied in T Narsipur and Nanjangud taluqs and mainly grown in medium black soil. Predominantly tuberose is cultivated by farmers for loose flowers. In recent times, they are not getting remuneration from tuberose cultivation mainly due to growing local varieties, maximum of 10-20 gunts cultivation by each farmer and increase of labour wages especially for flower harvest. With this background, KVK Mysore introduced improved variety of tuberose Arka Shrinagar released by Indian Institute of Horticultural Research, Bangalore.

Ms Rajamma, daughter of Shri Parashivappa of Jeemarhalli village of Nanjangud taluk in Mysore, adopted tuberose cultivation in 0.4 ha under the guidance of KVK in 2006 and she earned Rs 30000/year. Further, she worked as techno agent linking fellow farmers to get subsidy/training/SHG formation etc., from KVK and other line departments and established Triveni SHG consisting of 15 women members with the financial assistance in the form of loan from Infra *Sys* Eco Management Pvt, Ltd., Bengalure. Group had taken up tube rose cultivation in 2.0 ha leased land with the technical backstopping from KVK and they are producing tuberose flowers year round. They are harvesting yield range berween 5-6 t/ha based on the season, more production in summer and less production in winter. Group is selling flowers with wide range between Rs 60-150/kg as per the demand in local market, the highest price they get during festival and marriage seasons. On an average each member of group is earning Rs 3000/month. Besides, they are providing employment opportunities to rural women by engaging them for harvesting of flowers especially during peak season of the crop. With the leadership of Ms Rajamma and constant guidance of KVK, group is continuing tube rose cultivation.

Salient Features

- Ms Rajamma self employed, raised from toe to two wheeler and created self employment for other farm women
- She was recognized as techno agent
- Each member of Triveni SHG earned @ Rs 3000/month by cultivation of tuberose on leased land
- Farm women got socio-economic empowerment through tuberose cultivation
- Improved variety of tuberose is now adopted by many farmers in 2 blocks of Mysore where it is mostly being cultivated.

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Sustainable Organic Farming through Vermicomposting

KVK Coochbehar, West Bengal

In the present day agriculture, more and more emphasis is given on increased production and use of organic and bio-nutrients in crop production to minimize the reliance on chemicals, conservation of natural resources and environment as well as to maintain soil health. Endeavour of KVK Coochbehar greatly facilitated dissemination of organic agriculture as well as creation of income and employment generation through production of vermicompost.

To sensitize farmers and rural youths, KVK took up successive intervention right from selection of target group of respondents to training, demonstration and feed back analysis. Altogether 505 personnel were trained on different aspects of vermicompost production. Out of trained personnel, 326 persons are producing vermicompost either for their own use in farm or small scale marketing. However, five trained youths namely Shri Anup Kumar Moitri, Shri Dipak Nandi, Shri Biswajit Roy, Shri Safikul Islam and Smt Pratima are now marketing their produce in the respective brand names viz., Kisan, Swarna, Uttarer Sona, Sabuj Sona and Jaibo Ahhar and earning substantial income from the total production of 8706 q of vermicompsot for the period from 2006 to 2008 besides generating 23559 man days employment directly and indirectly. Entire produce is being used by farmers of the district to convert inorganic agriculture into organic.

Salient Features

- Vermicompost became an important source of organic farming, providing opportunity for self employment and income generation
- Commercial cultivation of vermicompost becoming fast popular in Coochbehar district
- Rural youths are successfully producing and selling vermicompost in their own brand name

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Leaf Colour Chart Minimised Over Dose of Nitrogen

KVK Sangrur, Punjab

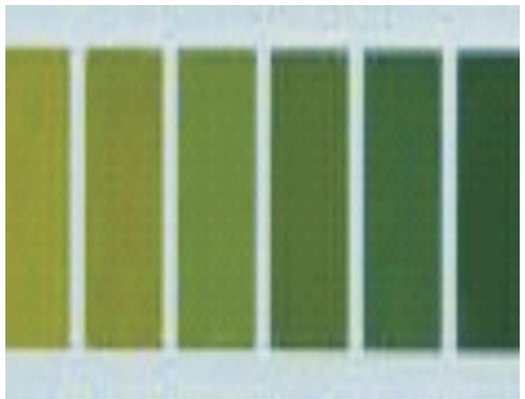
Leaf colour chart (LCC) is the recommended technology for applying proper dosage of nitrogen to rice crop. It has been seen that the farmers apply more doses of nitrogenous fertilizer beyond the recommended limits. They are also unaware of the adverse effects of indiscriminate use of nitrogenous fertilizers that not only pollutes the underground water but also affects the ozone layer which protects us from the ultraviolet rays of the sun. By using LCC, the proper use of nitrogenous fertilizer is possible without affecting crop yield.

LCC is a plastic strip of 8"x 3"size. On this strip, six small strips of green colour with different shades are fitted. Strip one has light green colour and strip six has dark green colour. There are emerging lines on the strips that give the look of a leaf and help in matching the colour with the leaves. While using this technique, it is recommended that apply 62.5 kg urea per ha after the last puddling of the field and then apply urea after matching the colour of new top of fully opened leaves of plant with LCC. To know the fertilizer requirement, start matching the colour of leaves after two weeks of transplanting with the fourth number strip. Keep on matching the colour for 7-10 days. Every time select 10 disease free leaves and match the colour of leaves, without plucking them from the plant, with the fourth strip of colour chart. If out of 10 leaves, colour of 6 leaves matches with the fourth strip colour, then there is no need to add fertilizer. OFTs conducted on LCC indicated that there was a saving of around 17.5-22.5 kg of urea per ha when it is applied on the basis of observations of LCC as compared to the traditional methods of fertilizer application.

KVKs of rice belt in Punjab organized 56 training courses on LCC covering 1065 rice farmers as well as 21 demonstrations in their fields. As a result of KVKs effort and increasing prices of fertilizers, the technology is being disseminated and widely adopted among the rice farmers.

Salient Features

- Easy to use LCC
- Saving of over dose of urea application by LCC
- Gives yield of paddy at par with the conventional method through LCC
- LCC can be used as one of the resource conservation technologies



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INM Balanced Fertilizer Use

KVK Yamuna Nagar, Haryana

With the intensification of cropping systems and imbalanced use of inputs, sustainability of the soil and environment was affected adversely. Inadequate replenishment of nutrients through fertilizers and manures has resulted in widespread nutrient deficiencies. Poor soil fertility has become the major cause of low productivity. For most efficient use of fertilizers, all nutrients must be used in balanced quantity. Nutrient use ratio between $N:P_2O_5:K_2O$ in Yamuna Nagar was 21.3:5.5:1 in the year 2001-2002 which was reduced to 13.5:5:1 in the year 2008-2009 whereas in balanced fertilization it should be 4:2:1. To narrow down the gap , use of potash in sugarcane, wheat and rice was promoted through demonstrations at farmers fields by KVK Yamuna Nagar. Results indicated that application of potash @ 50 kg K_2O/ha and 75 kg K_2O/ha increased yield of sugarcane by 7.8 and 10.5%, respectively over control. Incremental Benefit Cost Ratio of 24.2 and 22.5 were observed with 50 and 75 Kg K_2O/ha . While in case of wheat and rice, grain yield increased by 4.6 and 3.4%, respectively over control with incremental Benefit Cost Ratio of 2.54 and 5.41. As a result, demand of potash is increasing in district Yamuna Nagar which will ultimately result in narrowing down of N:P:K ratio further.

Balanced fertilization using bio-fertilizers (low cost input) would also be helpful to sustain crop yield and maintain soil fertility/soil health. Use of bio-fertilizers was demonstrated at farmers fields in wheat and potato crop during 2005-2006 to 2008-2009. Bio-fertilizers (Azotobactor + Phosphotika) were demonstrated in wheat which resulted in increase in grain yield by 4.0 to 5.1% over control. It also indicated that with additional cost of Rs 175/ha in wheat, additional gross return of Rs 1551 to 2484 per ha could be achieved. Incremental Benefit Cost Ratio during 2005-2006 was 8.86 which increased to 14.19 during 2008-2009. In potato crop, bio-fertilizer application resulted in increase of 21.9 q/ha potato tuber yield over control with incremental Benefit Cost Ratio of 18.77.It was observed that bio-fertilizers must be used along with balanced use of fertilizer to achieve higher yield. Moreover, they are low cost inputs and hence result in high Benefit Cost Ratio.

Salient Features

- Bio-fertilizers along with balanced use of fertilizer achieved higher yield
- Bio-fertilizers are low cost inputs and hence resulted in high Benefit Cost Ratio
- Being low cost inputs, bio-fertilizers can be easily adopted by small and marginal farmers
- Used potash to correct the ratio of NPK

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Farmers Elevated Recycling Redgram Stalks

KVK Gulbarga, Karnataka

Area occupied by pulses is about 3.75 lakh ha in Gulbarga district. As redgram produces about 5.0 t of stalks per ha, farmers burn these stalks which results in loss of nutrients as well as creates environmental pollution. With this background, KVK Gulbarga introduced vermicomposting technology on a large scale with a new approach in 2005-06. KVK selected 10 willing farmers, 2 from each village and trained them on production of vermicompost . Then, KVK provided 1 kg earth worms to each trainee farmer with a condition that each of them should intern provide 1 kg worms to minimum three willing farmers of their respective village with no cost after 3 months by putting the same condition to those farmers and so on the chain continues. These farmers were ultimately made master trainers by providing advance training and finally known as technocrats. KVK involved farmers, bankers, officials from development departments and industries as stake holders while implementing the approach. Banks provided the loan for establishing vermicompost units and KVIC & DIC provided subsidy of 25%. This approach worked well.

Initially KVK produced only 10 technocrats in five villages namely Kodla, Gurur (B), Melakunda, Gudur and Tadkal. Now there are about 100 technocrats in the district with 220 vermicomposting units, out of which 20 are large scale with the capacity of more than 200 t/year, 50 medium scale with 100-200 t/year and 150 small scale with 100 t/year. Besides, many units with the capacity of 10-20 t/year were established. Production of vermicompost in an area of 100'x60' with 48 pits of size (10'x3'x2') is now giving net income of Rs 5.00 to 5.50 lakh per year by sale of vermicompost and worms of which sale of worms alone contributing Rs 1.00 to 1.50 lakh. Thus, establishment of vermicomposting units provided additional income, created on farm employment, social pride as well as reduced the burning of crop residues by recycling and improved the soil health. Shri Shivanand Garur (09449638591) from Gudur village, Shri Adbul Latif Madra (09901359107), Shri Chitrashekhar Parashivappagol (09972057248) from Tadtegnoor village, Shri Shivanand Belle (08477-229013), Shri Basavaraj

Salient Features

- Trained willing farmers till they become as technocrats
- Technocrats intern trained willing farmers in a chain process
- Involved all concerned as stakeholders
- Established small, medium and large scale vermicomposting units and stopped burning of crop residues and started recycling of redgram stalks which improved soil health
- Established marketing through farmer to farmer and more than 20000 t vermicompost is being sold every year

Pavadashetty (09980391977) from Tadakal village, Shri Suresh Patil (09880171787), Shri Umesh N. (08477-229014) from Munnalli village, Shri Ravi Mulage (08477-229291) from Kinni Sultan village, Shri Kalyanrao Patil (08477-210529) from Alanga village, Shri Baburao Hiramashetti (09972897961) from Ladmugali village, Shri Dharmaraj Sahu (09448576795), Shri B.K. Patil (09945515261) from Bhusanoor village, Shri Basavaraj Warad (09448204566) from Gola (B) village, Shri Mallinath Nimbal (09449829670) from Madan Hipparga village, Shri Basavaraj Jeevanagi (09449775662), Shri Siddarood Halimani, Shri Gundappa Dulgand (08472-290127), Shri Shivasharanappa Bulla from Pattan village, Shri Shivalingappa Choragasti (09945870671) from Bhimmalli village, Shri Shivasharanappa (09448586164) from Jambaga village, Shri Gurupadling Maharaj (09480161783), Smt Bharatibai Jeevanagi (09448333953) from Babalad (IK) village, Shri Shamarao Patil (09902837727), Shri Mallikarjun Patil from Garur village and Shri Mahendra Shah (09448749587) from Sedam village are some of the technocrats in Gulbarga district.

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Lac Cultivation - A Boon For Tribes

KVK Kaimur, Bihar

Sarodag, a remote village under Adaura block of Kaimur district is tribal dominated. Village is surrounded by forest and rocky land with little scope for agricultural practices and villagers used to migrate to towns to earn bread and butter.

Shri Loknath, a tribal farmer of this village, however, did not loose hope and observing the availability of trees like ber, palas and kusum in plenty in the surrounding forest thought of taking up lac production practice. He shared his idea with fellow farmers and approached KVK Kaimur to make lac cultivation a reality.

The idea was readily accepted by KVK who in turn arranged for a few short duration training courses on lac cultivation and processing. Training was followed by providing secateur, dauli, tree-prunner etc. through DST working in that area. Trained farmers under the leadership of Shri Loknath and with the guidance of KVK started pruning schedule on kusum and ber from January and February, respectively, in the year 2005. He inoculated 80 kg kusum brood lac in August, 2005 provided by DST and followed schedule of spraying and harvesting. Scrapped lac of 5 q was produced by farmers fetched Rs75000 during March, 2006. Availability of quality brood lac on Kusum trees during summer season also helped them carrying out lac cultivation throughout the year. Tribal farmers are earning more than Rs 50000 annually from lac cultivation besides adopting proper cultivation practices for agricultural crops in their small holdings.

Salient Features

- Cultivated lac throughout the year on ber, palas and kusum as host trees for brooding lac
- As raw lack has very good market in Bihar, lac cultivation to be a sustained livelihood
- Creation of awarness and development of skill among tribal of Kaimur Plateau by KVK, they adopted lac cultivation and improved their economic condition

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CROP PROTECTION

Effective Management of Mealy Bug in Cotton

KVK Faridkot, Punjab

Cotton, popularly known as White Gold, is an important *Kharif* crop of Punjab. It is grown in South- Western districts of the state where underground water is brackish in nature and about 85 % of the area is irrigated by canals. During the year 2007-08, a serious problem of mealy bug emerged for the first time on cotton crop and caused huge losses including recommended non-Bt and Bt genotypes, but was more severe on un-recommended Bt hybrids from Gujarat.

To overcome this problem, KVK Faridkot played a vital role. KVK educated and guided cotton growers to control mealy bug through recommendations of Punjab Agricultural University and Central Institute for Cotton Research. Recommendations includes - spraying infected row of cotton with curacron @ 1250 ml/ha or buprofenzin @ 1250 ml/ha, stacking cotton sticks from infected rows separately and use them at the earliest as fuel before end of February, not to stack cotton sticks in the field, eradication of alternate hosts like kanghi buti, peeli buti, congress grass, etc. and spraying trees and fruit plants near cotton fields harboring mealy bug population with curacron @ 1250 ml/ha or buprofenzin @ 1250 ml/ha.

Salient Features

- Sprayed recommended chemicals on mealy bug infected cotton crop
- Sprayed recommended chemicals on mealy bug harboring trees and fruit plants near cotton fields
- Stacked the cotton sticks from infected rows separately and used them as fuel before end of February
- Cotton sticks were not stacked in the field
- Eradicated the alternate hosts of cotton mealy bug

A series of activities such as training programmes, campaigns, field visits, field days and farmers group discussions were organized by KVK for cotton growers of Punjab and created awareness, knowledge and skill on management of cotton mealy bug. Thus, effort of KVK and farmers together helped in keeping mealy bug under check to an extent of 80-85 %.

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Velda become an Ideal IPM Village

KVK Tapi, Gujarat

Production of cotton is highly affected due to insect pests infestation in tribal village Velda of Tapi district situated 105 km away from district headquarter and KVK. It is one of the most neglected block as no extension agency visited here due to difficult terrain. Farmers were not aware of low cost insect pests management technique besides unable to afford costly pesticides due to low income. KVK Tapi selected Velda village for IPM under Sattelite Village Programme launched by NAU, Navsari to disseminate low cost Integrated Pest Management (IPM) during 2007-08. KVK conducted 100 demonstrations covering 75 ha area on IPM. Farmers were trained rigorously on IPM module involving neem based pesticides including chemicals. IPM reduced cultivation cost by 50% due to reduction of number of sprays from 10 to 5 there by increased income of farmers by 66%. Continuous follow up on IPM encouraged other farmers to adopt IPM technology during 2008-09.

Whole village become an IPM village and farmers are providing technical know-how to neighbouring villages by the end of year 2009-10. This year 10-15 tribal villages in surrounding have adopted IPM package disseminated by KVK. District authorities declared Velda village as IPM village in 2010. Higher income from cotton helped farmers to send their children to schools by paying their fees comfortably which would improve the literacy in the tribal area. Pre and post assessment by means of survey revealed that IPM module is highly effective in controlling sucking and other insects as well as reduced cost of cultivation in addition to higher yields. This has contributed to the successful adoption of IPM in cotton and other crops. Further success was built confidence among farmers.

Salient Features

- IPM reduced cultivation cost by 40% owing to reducing number of sprays from 10 to 5
- Enhanced income of farmers by 66%
- Minimized hazards of chemicals on environmental pollution as well as human health
- Declared Velda village as IPM village

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Brinjal Farmers Benefited through Water Trap

KVK Ahmednagar, Maharashtra

Brinjal is grown extensively in Ahmednagar district with an area of 3000 ha. Out of which, 60% area under brinjal cultivation occupied in medium to heavy black soils under irrigated condition in Rahuri , Sangamaner, Shirampur and Rahata Talukas. Infestation of shoot and fruit borer in brinjal is very common in this region and causing 30-35 % crop loss. Further, farmers are incurring heavy expenditure because they are using chemical control measures against this pest but results are not satisfactory.

At this juncture, KVK Ahmednagar introduced water trap for control of brinjal shoot and fruit borer after testing its efficacy in 19.2 ha in farmers fields at village Chincholi. Due to water traps, spray interval in these fields increased from 5-6 to10 to 12 days and farmers could save Rs 2500/ha/ month on pesticides. Yield increased by 18.66 % (316.25 q/ha) besides reduction in cost of plant protection by 30 % with Benefit Cost Ratio of 2.46. As availability of water traps at local level was not there, KVK arranged 6000 water traps to 296 brinjal growers covering 89 villages from 11 blocks of the district. Besides, technology has been adopted by more than 1000 farmers covering 500 ha in the district. Concept has now become regular practice among all brinjal growers of the district. It has also been observed that technology is being horizontally disseminated from farmer to farmer in Ahmednagar district. State Department of Agriculture also taken up large scale programme on water traps involving more than 100 farmers from Rahuri block of the district where there is major area under brinjal crop in which KVK played an active role.

Salient Features

- KVK introduced eco-friendly and low cost water trap
- Due to water trap spray interval was increased and reduced the application of pesticides as well as expenditure on plant protection
- Water trap was adopted against shoot and fruit borer of brinjal in 1500 ha area
- More than 1000 farmers benefited by use of water trap in Ahmednagar district of Maharashtra

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Ginger Cultivation Revived

KVK South Sikkim, Sikkim

Productivity of ginger in Sikkim has declined for the past one decade due to rampant infestation of soft-rot, dry-rot, white grub and borer. This led to ginger cultivation uneconomical and farmers unwillingness to go for ginger cultivation. As a instance, farmers of Phongla village who totally stopped ginger cultivation due to this problem.

KVK South Sikkim re-introduced ginger cultivation in Phongla village through Farmers Club and supported them technically in May 2009. Instead of Bordeaux Mixture (lime, copper, water at the ratio of 1:1:10) which cost Rs 300 approximately, KVK advocated Fermented Plant Extract (FPE) preparation using (garlic + onion leaves + Canavis sp + wild poisonous plant) + (cow urine) + (EM solution) + (extract after washing polished rice) + (alcohol) + (water) (1:1:1:1:1:15), sufficient for 1.0 ha which cost Rs 375 for seed treatment against soft rot. FPE was applied after every fortnight by using watering can for next 2 month i.e. up to July end. Total cost of the same which came to Rs1500. This enabled controlling various diseases affecting ginger crop. Farmers Club produced 96 q of rhizome from 0.3 ha which valued Rs144000 and gained Rs 141900 excluding the labour component as it was undertaken on participatory basis. Efforts of Phongla Farmers Club was recognized by NABARD and awarded 2nd best Farmers Club of Sikkim. NABARD has nominated them for National Award also. Farmers club assured to supply of 400 q of disease free ginger seed to Horticulture and Cash Crop Development Department in ensuing season.

Salient Features

- Ginger cultivation was totally stopped in Phongla village due to heavy crop loss from uncontrolled pests and diseases
- Re-introduced ginger cultivation in Phongla village by KVK through Farmers Club
- Fermented Plant Extract prepartion was used for seed treatment against pests and diseases
- Achieved disease free ginger production and revived ginger cultivation in the village Phongla

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Trichoderma made Tribes Sustain

KVK Wayanad, Kerala

Wayanad is known as Land of Spices. Major Income generating crop of Wayanad is pepper. Production of pepper declined due to the incidence of foot rot disease. KVK Wayanad identified and isolated *Trichoderma* strains from Wayanad soil for effective management of foot rot disease of pepper. KVK started production of *Trichoderma* in late 90's. *Trichoderma* gained popularity and thus demand was increased. To meet the increased demand, KVK ventured in to mass production of bio-control agents.

For getting man power, 13 tribal women (youth) from Nellarachal tribal colony were selected and imparted training for mass production of bio-control agents in view of providing them self employment. In fact, due to implementation of Karapuzha irrigation project, tribals have lost their agricultural fields which were the main source of income for livelihood. Trained tribal women registered as SHG named SABARI. Then, KVK extended work contract with SABARI for mass multiplication and distribution of *Trichoderma* under revolving fund activities of KVK. Members of SHG gained 30-35 % of the total benefit as per MOU signed.

Salient Features

- Selected SHG group (SABARI) belongs to tribal hamlets who were the victims of implementation of Karapuzha irrigation project
- Trained tribal women formed as registered society SABARI and taking work contract for mass production of bio-agents
- Members of SABARI are earning at present a monthly income of Rs 5000 by engaging in mass multiplication of *Trichoderma*, which has revolutionized the income pattern of their family

As there is no government or private agency in the district other than KVK through SABARI producing bio-control agents, State Planning Board sanctioned Rs 36.39 lakh for modernizing existing bio-control lab of KVK for large scale production of *Trichoderma* and *Pseudomonas*. Now Kendra is having a well established and fully equipped lab which can produce *Trichoderma* and *Pseudomonas* @ 2 t/month.

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FARM MECHANIZATION

Zero Tillage Benefited Multiple Ways

KVK Panipat, Haryana

Zero-till concept of sowing refers to planting crops without any preparatory tillage through suitably designed machines within the residues of previous crop. Subsequent experiments revealed that Zero Tillage (ZT) was a feasible alternative to conventional tillage practice in wheat with multiple benefits including check on the proliferation of *Phalaris minor*, resource conservation and yield gain. Efforts were made by KVK Panipat to accelerate this technology within Rice-Wheat Cropping System (RWCS) in the Indo-Gangetic Plains.

Before the introduction of zero tillage, village Bauhapur was considered as marginal with respect to wheat productivity stagnating around 3.5 t/ha. Yield of any field exceeding 4.0 t/ha was considered as exceptional by the villagers. Delayed seeding, broadcast sowing, reduced germination and low seedling vigor due to salt load in the root zone and anaerobic condition persisting long after first irrigation at CRI stage were the major yield limiting factors. Frontline demonstrations in *rabi* 2007-08 reveled that yield level of even 6.0 t/ha is achievable in marginal ecology of this village under ZT. Area under ZT increased from meager 4.0 ha in 1998-99 to around 436.0 ha in 2008-09 covering around 95.2 % of total wheat area. With a total of 22 ZT Drills in the village, area covered by single Drill exceeding 20.0 ha indicates the custom hiring by small land owners.

Salient Features

- Sowing of wheat in residual soil moisture is possible by ZT
- ZT Drill is time, labour and money saving technology
- Timely sowing of wheat is possible through ZT Drill
- ZT helps in recycling of plant nutrients and mitigates the problem of crop residues
- Derive multiple benefits through ZT technology

Average monetary advantage in ZT over conventional tillage at the current rate of input and output is around Rs 6000/ha. This includes the yield advantage and cost reduction. Total economic gains by farmers of this village by virtue of ZT adoption in a decade period is about Rs 1.18 crore. It is an achievement of KVK in terms of field work. This case study indicates that issues of resource conservation can be dealt in better way if it is intermingled with simultaneous profit gain.

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Zero Tillage – Boon For Rice - Wheat System

KVK Pratapgarh, Uttar Pradesh

Mangarh is a village situated at a distance of about 10 km from KVK Pratapgarh on Kunda-Sangramgarh road. Rice-wheat is major cropping system prevailing in the area. Major crops grown are rice, wheat, mustard and pea. As a resource conservation in agriculture, KVK introduced Zero Tillage (ZT) in rice-wheat system through demonstrations, training and extension activities. Further KVK laid out demonstration unit on ZT in its farm for undertaking training and visitors purpose. Shri Mahendra Das, trainee of KVK, convinced and adopted ZT under the technical guidance of KVK in 3 ha in 2002, where as Shri Arvind Singh first tried it on small area by opening a furrow with help of knife and sown 100 seeds of wheat. He found that all the seeds have germinated so his doubt regarding germination was cleared and he adopted ZT in 0.25 ha. In this system, no ploughing was done while 4-5 times field was tilled by cultivators under conventional tillage. Major benefits of ZT accrued were reduced cost on land preparation, placement of DAP at right depth, saving fuel and more economic as compared to conventional tillage.

ZT percolated to near by villages like Laru, Meerapur, Barai, Sahajani, Kajipur, Kusemar etc and within a short span of two years, area under zero tillage was expanded to 110 ha in 2004 followed by 210 ha in 2005 and in the year 2006 almost 50% of the total wheat area of Mangarh was under ZT i.e. about 275 ha. At present ZT spread in 84 villages. Total 42 ZT Drills were purchased by farmers. Besides 8 Drills were given to Farmer Field Schools by U.P.Usar Sudhar Nigam Ltd. Farmers are now operating ZT Drills on custom hiring and charging at about Rs 1200/ha for sowing through ZT Drill. Zero tillage led employment to rural youths. Diversified use of ZT technology in paddy, pulses and oilseeds other than wheat was explored.

Salient Features

- KVK convinced farmers about ZT technology
- ZT technology has spread in 84 villages and covered 275 ha area in 3 years
- ZT technology benefitted by reduced cost on land preparation, placement of DAP at right depth, saving fuel and more economic as compared to conventional tillage
- Diversified use of ZT technology in paddy, pulses, oilseeds other than wheat is possible

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Zero Tillage Immensely Adopted by Wheat Growers

KVK Jamui, Bihar

KVK Jamui introduced Zero Tillage (ZT) technology by considering its potential as a resource conservation technology through various activities. Shri Mukesh Kumar of Lakra village of Jamui dstrict, Bihar was a traditional wheat cultivator. But the consistent low profitability due to higher cultivation cost created insecurity as he had to feed a good number of family members. He under went training on ZT at KVK and adopted the same in his field under the technical guidance of KVK. Supervised all activities by KVK to make it sure that Shri Kumar successfully practice this new method of cultivation. With the application of this technology he could advance the seed sowing operation by 7 days and ignore the land preparation cost of 4-5 ploughings. It saved Rs3000 in 1.0 ha of land. He also saved 30 kg of wheat seed and 30 kg DAP (total cost being Rs 800) in first phase of wheat cultivation by ZT. After 20 days of sowing he irrigated his field which saved 40% diesel and 25% of irrigation water. At the time of harvesting he observed that in spite of using minimum fertilizers and irrigation water the yield was increased by 12%. Net income from wheat by adopting ZT technology was increased to Rs 5000/ha. Thus his annual income from wheat cultivation was increased from Rs 9000 to11000. Savings made through lower seed rate, less amount of fertilizer, less number of labour and less use of irrigation water was utilized for other agricultural crops and vegetable cultivation through which he earned a net profit of Rs16000. Overall success of this technology has influenced the farmers so much that a large number of farmers are approaching KVK for specialized training on ZT technology. Now it has become so immensely popular ZT technology in the entire district that the KVK staff feel delight.

Salient Features

- ZT technology is a cost effective resource conservation technology
- Sowing of successive crop in time is ensured avoiding excess moisture and late harvest of preceding crop
- Soil health is maintained avoiding excess tillage
- Increase in yield is possible through ZT technology

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Resource Conservation Interventions in Rice-wheat System

KVK Pratapgarh, Uttar Pradesh

Attempts were initiated to disseminate Direct Seeded Rice (DSR) wheat which is versatile in most of agro ecological conditions or at least for major rice growing area of the district Pratapgarh to increase rice and wheat productivity. KVK Pratapgarh introduced Zero Tillage (ZT) by conducting demonstration during *rabi* season 2001-02 in village Alapur in the field of Shri Ram Ajor Tripathi. Similar demonstration was laid at KVK farm in comparison with conventional tillage wheat. Initial results were encouraged and since then the KVK disseminated such a farm worthy technology in Pratapgarh by a systematic schedule of programme with a view to increase ZT coverage adoption in terms of number of farmers and villages.

Limited tractor uses and controlled water use in DSR reduced the cost of cultivation to Rs 6000/ha and therefore, increased the profit margin to farmers at Rs 8000-10000/ha. Yield of DSR was higher than transplanted rice at all three locations in both the cultivars with an average yield of 5.3 t/ha. Where as yield of transplanted rice was 4.8 t/ha thus a yield increment of 9.4% was observed due to ZT technology. It was also observed that ZT in wheat leads to higher yield with saving in tillage cost. By adopting ZT, the gross margin and Benefit Cost Ratio was higher in comparison to traditional tillage. Farmers of the area have appreciated new ZT technology and adopting in their fields especially in to reduce tillage cost in rice-wheat system.

Salient Features

- Adoption of ZT technology and direct seeded rice increased farmers profit, improved their livelihood and eventually reduced poverty
- DSR reduced cost of cultivation to Rs 6000/ha and therefore, increased the profit margin to farmers at Rs 8000-10000/ha
- Yield of DSR was higher than transplanted rice at all 3 locations with an average yield 5.3 t/ha
- ZT technology enhances water and fertilizer use efficiency

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Zero Tillage Assuresd Rabi Maize Production

KVK Karimnagar, Andhra Pradesh

Rabi maize is cultivated in more than 10000 ha after harvest of rice in Karimnagar district of Andhra Pradesh. Crop is sown after preparatory cultivation which requires 1-2 months period after harvest of rice. After preparatory cultivation the fine tilth is not attained resulting poor germination. Further due to late sowing of maize after harvesting of *kharif* rice, crop often suffer from terminal moisture stress resulting yield loss under canal command areas.

To address the above problems of maize cultivation during *rabi*, KVK Karimnagar introduced technology of Zero Tillage (ZT) - Maize of Acharya N.G.Ranga Agricultural University through its different activities. First technology was assessed at 12 locations in villages Keshavapur, Gopalpur and Ippala Narsingapur during *rabi* 2007-08 and 2008-09. Farmers feedback indicated that the yield in ZT maize are on par with normal maize (66.25 q/ha) and in some situations slightly higher than normal maize. Technology is proved to be resource conservative as the time taken for land preparation is nil compared to 15-20 days in normal sowing. In order to create awareness as as dissemination of ZT technology, 42 training programmes were conducted to farmers and extension personnel. Ten cluster level master trainers were identified and given thorough training in package of practices of ZT maize. Master trainers conducted 72 field demonstrations and explained the technology to fellow farmers. Methodology and results were published as 2 popular articles in *Padi pantalu*. Extensive coverage through mass media also helped ZT technology to reach more number of farmers in the district. With the above efforts, the technology has spread at present to 52 villages with 388 farmers in 286 ha.

Salient Features

- KVK conducted a series of activities for introduction of ZT for *rabi* maize cultivation
- Yield of ZT maize was on par with that of normal maize
- ZT can be used as one of the resource conservative technologies in agriculture
- ZT is being followed by 388 farmers belonging to 52 villages in 286 ha
- ZT assured the production of *rabi* maize in Karimnagar district of Andhra Pradesh

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Micro-irrigation and Protected Cultivation – A Way to Increase Farm Income

KVK Pithoragarh, Uttarakhand

Agro-ecological situation of the hills offers great potential for offseason vegetable cultivation and increase farm income. But unpredicted rains, hails or low temperature hamper vegetable cultivation up to a reasonable extent. In this condition, protected cultivation i.e. nursery/vegetable cultivation under polyhouse, seems to be beneficial for farmers. KVK Pithoragarh has taken an initiative and conducted number of trainings on protected cultivation, polyhouse construction, low cost polyhouse designed with local resources and poly low tunnel technologies. Beside these trainings, farmers were also taken to KVK Champawat for training and demonstration on micro-irrigation. Encouraged by KVK, Shri Narayan Giri cultivated offseason vegetable cultivation in 2005. He has 2.5 ha land, out of which only 1.0 ha land is cultivable and rest of the land covered with bushes, forest tree and few fruit trees. He started vegetable cultivation in 0.1 ha but faced many problems due to uneven distribution of rains, short crop season etc. Then he again came to KVK with his problems and adopted protected cultivation under the technical guidance of KVK. Further, he underwent training on polyhouse management. Under subsidy scheme of horticulture department, Shri Giri constructed a polyhouse and started off-season vegetables cultivation at large scale. He utilized his polyhouse for nursery raising for cultivation of tomato and capsicum.

Salient Features

- KVK conducted a series of activities for introduction of ZT for *rabi* maize cultivation
- Yield of ZT maize was on par with that of normal maize
- ZT can be used as one of the resource conservative technologies in agriculture
- ZT is being followed by 388 farmers belonging to 52 villages in 286 ha
- ZT assured the production of *rabi* maize in Karimnagar district of Andhra Pradesh

Shri Giri got encouraged from the success of protected cultivation. Then again he underwent training at KVK and installed drip irrigation system in his polyhouse and orchard. Trainings continued by KVK on protected cultivation and micro-irrigation and trained 122 farmers during last few years. Under the technical guidance of KVK, farmers from different villages established 344 polyhouses and 72 ha area under drip-irrigation in the district. Technologies have shown its impact on total vegetable production and living standard of farm families.

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Rice Residues Managed through Happy Seeder

KVK Sangrur, Punjab

Rice- wheat is the major cropping system of Punjab occupying about 26.5 lakh ha area in the state. Increasing constraint of labour has led to adoption of mechanized farming in highly intensive rice-wheat system. Burning is normal and easiest method of rice stubble management because residues interfere with tillage and seeding operations for next crop. Despite ban by the government, farmers have been burning rice crop residues which is causing damage to environment, human/animal health, plant nutrients, soil microbes and biodiversity. It has become major cause of accidents also.

Happy Seeder which combines stubble mulching and seed drilling was used effectively to combat this problem. It consists of a rotor mounted with gamma type blades for managing rice residues and a Zero Tillage (ZT) Drill for sowing of wheat. Happy Seeder cuts standing stubbles/loose straw coming in front of sowing tyne and cleans each tyne twice in one rotation of rotor for proper placement of seed in soil. Rotor blades push residues as surface mulch between seeded rows. Machine can be operated with 50-55 hp tractor and can cover 0.3-0.4 ha in one hour. Cost of machine is about Rs110000.

During last three years, KVK Sangrur made efforts to popularize this environment friendly technology. A total of 34 training programmes were organized benefitting 638 farmers, farm women and rural youth. Further, conducted 6 demonstrations on Happy Seeder. Results of demonstrations showed 5-10 % increase in yield of wheat sown through Happy Seeder as compared to wheat sown through conventional method. Efforts of KVK through trainings and demonstrations at different places in collaboration with different co-operative societies resulted in sowing of wheat in more than 800 ha with Happy Seeder in Punjab in 2009.

Salient Features

- Low cost environment friendly technology
- Timely sowing of wheat
- Sowing of wheat in the residual soil moisture
- Helps in soil moisture conservation
- Helps in recycling of plant nutrients and mitigates the problem of crop residues
- Can be used as one of the resource conservation technologies

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Farm Women Friendly Weeder

KVK Gadag, Karnataka

Small and marginal farmers of Gadag district faced problems of high hiring charges as well as timely availability of bullock pair for hoeing. Farm women of these families are being used the bullock drawn hoeing equipment with their hands as bullock pair was not available in time on hiring basis. But the drudgery of using bullock drawn hoeing equipment by women was too severe and the pain experienced by farmwomen was too much. In this background, KVK Gadag brought Twin Wheel Hoe Weeder from the Central Institute of Agricultural Engineering (CIAE) and demonstrated in farmers fields during 2003-04. Based on the feedback from farm women, Twin Wheel Hoe Weeder was refined by changing the blade from "V" shape (120^0) to horizontal shape (180^0) in 3 sizes viz., 9", 10" and 12" to suit to inter row space of crops in Gadag district such as greengram, groundnut, onion etc which are sown in different row spacing as well as to reduce pain in shoulders of farm women during 2004-05. Refined Twin Wheel Hoe Weeder was popularized through frontline demonstrations, extension activities and also publishing article in Newspaper. As per the demand, KVK procured 270 Twin Wheel Hoe Weeders from CIAE and refined them as said abobe and supplied to farm women in Gadag district and farmers from other districts like Tumakur, Hasan, Chikkamangalore, Bellary, Gangavati, Bangalore etc. who visited KVK .

Data collected from 93 farm women who are using refined Twin Wheel Hoe Weeder for the past 3-4 years indicated that the labour requirement per ha for hoeing with bullocks and hand weeding was 28, 46, 18, 18 and 81 labours in greengram, groundnut, rabi jowar, bengalgram and onion crops where as with refined Twin Wheel Hoe Weeder and hand weeding, it was 15, 30, 16, 16 and 48 labours and saves Rs1080, Rs 1560, Rs 720, Rs 720, and Rs 2580 per ha, respectively. In addition farm women expressed that timeliness in weeding and hoeing operation is possible only by using refined Twin Wheel Hoe Weeder which otherwise is not possible in hoeing with bullocks. Study further revealed that inter-cultivation with bullocks was not possible within 45 days of onion crop due to tampering by bullocks and also mechanical damage to onion bulbs where as it was done with refined Twin Wheel Hoe Weeder without damage to bulbs. Many cases family labour was involved in operating refined Twin Wheel Hoe Weeder.

At present 545 farm women are using refined Twin Wheel Hoe Weeder (350 SHG members and 195 non SHG members) in 142 ha of greengram, 196 ha of groundnut, 153 ha of rabi jowar, 98 ha of bengalgram and 76 ha of onion in Gadag district during 2009-10 and save Rs 1533600, Rs 305760, Rs 110160, Rs 70560, Rs 196080, respectively. Few of them are Smt Neelavva Nagappa Hosmani from Tejaswini SHG of Hombal village, Smt Gangavva Channappa Madikeri from Sarswati SHG of Hirehandigol village, Smt Shantavva Ninappa Tirlapur from Shambhavi SHG of Neelgund village, Smt Neelambike Ishwarapp Radder from Manjunath SHG of Mallasamudra village and Smt Jayashree Channaveer Shettar from Kamadenu SHG of Soratur village in Gadag taluq and district.

Salient Features

- Achieved timelines in hoeing and weeding in different crops through refined Twin Wheel Hoe Weeder
- Refined Twin Wheel Hoe Weeder reduced cost of weeding and hoeing, saved time and increased family labour
- Used refined Twin Wheel Hoe Weeder in close spaced crops (up to 12 inches) for early stage Inter cultivation

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Aonla Orchards Saved Using Solar Energy

KVK Pali, Rajasthan

In view of low income from traditional farming, a number of farmers had established aonla orchards with the financial support of NHM along with the technical guidance of KVK Pali. Around 7 years back they were earning good remuneration to support their family. In last 3 years heavy production of aonla glutted the market which reduced the prices to Rs1/kg causing heavy loss to aonla growers. They sought permission from collectorate, Pali for cutting trees. Collector, Pali discussed the problem with KVK and state officials to find a solution for the benefit of farmers. KVK submitted a training module on value addition, post harvest management and solar drying which was approved by the district Collector.

Accordingly, KVK organized 7 days training to aonla growers who started processing of aonla fruits like juice, squash, candy, churan powder, churan tablets, pickles, murrabah, etc. Drying of aonla fruits for making different products was both time and labour consuming. In this direction, one of the farmers, Shri Madan Lal Deora of village Nimaj of district Pali established a self designed solar tunnel drier using local skill in view of abundant solar radiation in the region. He erected dome like structure using iron rods and covered it with UV stabilized polythene sheet. Solar tunnel drier costs Rs 25000 only while manufacturers were selling such units for Rs 2.00 lakh. Drying of aonla pulp in open sun taking 10 days was completed within 2 days under this solar tunnel drier. Moisture content was reduced from 81% to 9% within 2 days under controlled environment. He dried green aonla to be used in number of ayurvedic medicines and traditional drugs by the pharmaceutical firms. He also dried aonla fruits after blanching to prepare various products.

Salient Features

- Value addition put aonla cultivation on right track
- Solar tunnel drier reduced the drying time from 10 to 2 days and brought down moisture content from 81 to 9 %
- Enhanced the income of aonla growers
- Ensured employment to 60 rural women
- Pharmaceutical firms placed demand

In view of heavy demand by private parties he started purchasing raw aonla directly from aonla growers @ Rs10/kg which enhanced the income of aonla growers within 2 years. Earlier his earning was Rs1.00 lakh which raised up to Rs 3.00 lakh per annum. Today he is providing ensured employment to 50-60 labourers during cropping season and employment to 4 labourers throughout the year. Each labour was paid Rs 200 per day. Price of aonla raised from Rs1 to Rs10 put back aonla cultivation on the right track. Inspired by the endeavour of Shri Madan Lal, farmers from other districts are going to establish such unit on their farm to enhance their income. Shri Madan Lal was conferred by social worker award by the district Collector, Pali during 2009-10.

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Laser Land Leveler Enhanced Water Use Efficiency

KVK Sangrur, Punjab

Purpose of leveling is to achieve uniform seedbed, reduce losses due to irrigation, conserve soil moisture, avoid soil erosion, improve irrigation water use efficiency and to promote efficient use of farm inputs. Generally, in rice-wheat rotation farmers believe that their fields are leveled and need no further leveling. But the digital elevation survey sheet of a fields shows that most of the fields are not adequately leveled. Enhancement of water use efficiency and farm productivity at field level is one of the best options to redress the problem of declining water level in the state.

It is a technology for using irrigation water efficiently as it reduces irrigation time and enhances productivity not only of water but also of other farm inputs. It includes laser emitter, laser receiver, two way hydraulic valve, laser eye, grade rod, tripod stand, control box on tractor and scraper unit. Laser leveling uses a laser transmitter unit that constantly emits 360°rotating beam parallel to the required field plane. This is received by a laser receiver fitted on the scrapper unit. The signal received is converted into cut and fill level adjustments and the corresponding changes in scraper level are carried out automatically by a two way hydraulic control valve. It generally takes 3.75 - 6.25 hour per ha if the mean cut and fill is within 10-20 cm. Cost of machine is about Rs 3.0 - 3.5 lakh.

Salient Features

- Enhanced water application efficiency
- Saved in irrigation water
- Even application of farm inputs
- Improved weed control efficiency
- Less area under bunds/channels
- Reduced labour requirement for irrigation
- Can be used as one of the resource conservation technologies

During last three years, KVK Sangrur carried out 23 training programmes on laser land levelling with 527 farmers. During *kharif*, 2009, approximately 220 ha of land in Patiala and 400 ha in Sangrur district have been leveled using laser leveler through village cooperative societies. Now the KVK is focusing on technical know-how and do-how among workers of co-operative societies for large scale adoption of technology.

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INTEGRATED FARMING SYSTEM

Nutritional Security through Integrated Nutrition Garden

KVK Fatehgarh Sahib, Punjab

Monoculture of rice-wheat cropping system in Fatehgarh Sahib district is showing the syndrome of un-sustainability in terms of depletion of groundwater and soil health as well as fertility. Area under fruits and vegetables is 0.6 and 5 %, respectively. A recent survey concludes that in villages, on an average, intake of pulses is around 40 g, vegetables 180 g and fruits in insignificant quantity while an adult requires 85 g pulses, 280-300 g vegetables and 30-50 g fruits per day for normal maintenance of health.

Keeping the above background in view, KVK Fatehgarh Sahib promoted the concept of integrated organic farming unit of kitchen garden for nutritional security of rural people and for diversification of rice-wheat cropping system in project mode from 2006-07 to 2008-09. Introduced model kitchen garden among fifty farm families from Suhag Heri village of the district. Based on soil and water testing report, different varieties of various vegetables, fruits and pulses were cultivated in an area of 1500 sq m meter out of which pulse crops of *rabi* and *kharif* seasons along with fruit plants grown in 1000 sq m and vegetable crops in 500 sq m. A series of activities such as 10 training programmes, 10 method demonstrations, 3 field days, 10 kisan goshties, 18 monitoring/guidance visits and 1 vegetable sowing camp were organized by KVK in the village covering 441 farmers and 445 farm women.

Salient Features

- Introduced model kitchen garden in project mode in Suhag Heri village of Fatehgarh Sahib district
- Created awareness, knowledge and skill among the farmers about the kitchen garden as well as importance of human nutrition through a series of activities
- Farmers gained dual benefits of earning from rice-wheat system and also achieved nutritional security by increasing the intake of vegetables, fruits and pulses

Pre and post survey of village indicated that farmers were able to earn about Rs 14296 from 3 canal area (1500 sq m) by cultivating vegetables, pulse crops and fruits which on far with the income from rice-wheat system. There was positive change in different food items consumption behavior of farm families. Now, on an average 80 g pulses, 250 g vegetables and 20 g fruits are being consumed per day by each member of family covered under project entitled Nutritional Security through Integrated Nutrition Garden.

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IFS Reimbursed in Multiple Ways

KVK Theni, Tamil Nadu

Shri P. Kottaisamy (09003442027) belonging to Kutchanur village in Uthamapalayam Taluk of Theni district in Tamil Nadu has 6 ha of cultivated land with adequate supply of irrigation and used to cultivate banana, cotton, coconut and groundnut by using heavy doses of fertilizers and pesticides. On continuous cultivation, he couldn't take up lead because of drastic reduction in production and also increased cost of cultivation. At one particular point of time, the cost of cultivation was equal to gross profit. Subsequent years pulled him down economically and under dept.

He adopted Integrated Farming System (IFS) in 2000 under the technical guidance of KVK Theni. He integrated his farm with horticultural crops, cereals and livestock. He mainly uses organic inputs in his farm. For this purpose, he established infrastructure with the production capacity of 15000 Kg cattle manure (50 cows), 3000 kg dried FYM, 500 kg enriched FYM, 20 t vermicompost, 6 t cattle feed mill (20 hp service motor), 25 t chaffed fodder (2 chaff cutters), 1500 hr use of mechanical weeders per month. Further, he grows maize, sorghum and cumbu in his farm as cattle feed. He solely depends for 90% of the inputs in his farm and only 10% of the inputs are purchased from market. He recycles the farm waste. Excess manure and other inputs sold to other farmers at 10 % less than the market price. Hence the input cost is enormously reduced and relative transport and labour cost also reduced. By reducing cost of cultivation and inputs, net profit increased by 30% and had a net profit of Rs12 lakh/year from all integrated enterprises.

Salient Features

- Produced enriched farm yard manure
- Achieved sufficient fodder production and established cattle feed mill
- Recycled farm waste through production of vermicompost
- Produced Jeevarmirtham and PanchaKavya
- Established drip irrigation as well as fertigation systems
- Followed mechanical weed management
- Created employment opportunity for men and women
- Reduced expenditure and increased net profits as well as soil health

Shri Kottaisamy also go for consultancy programme to various places inside and outside the state on IFS. He has provided employment opportunity to 15 women and 5 men who are continuously working in his farm. This IFS is a successful one because of its sustainability since 2000. There are about 200 farmers, farm women and rural youth and students from various parts of India have come and visited his farm and undergone training programme on various organic inputs preparation varying from one day to one week.

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IFS for Profitable Agriculture

KVK Lunglei, Mizoram

Tuipui D village in Lunglei district, Mizoram has potential for agriculture, horticulture and animal husbandry like dairy, piggery and poultry. Agro climatic variation offers much scope for cultivation of the temperate and tropical fruits and vegetables. Rice, maize, potato, orange, cabbage, cauliflower are the main crops. Village is mainly engaged in agriculture on their own or leased land and therefore agriculture is essential for subsistence of villagers. KVK Lunglei introduced Integrated Farming System(IFS) in Tuipui D village through a series of activities. As a result, farmers of this village have adopted IFS in an area of 5.5 ha in 2007-2008. Within a short span of two years, area was increased to around 10 ha generating an amount of Rs 50000/ha besides creating self employment.

Farmers integrated poultry and piggery in their farm under the technical backstopping of KVK. They adopted broiler (Vencobb) in deep litter and cage system. Around 40-50 birds are reared in one batch. Birds are sold when they attain 1.5 - 2.0 kg either dressed or live weight @ Rs 180 or Rs 140, respectively. Litters are used as manure to crops in the farm. Many farmers adopted crossbreeds of large white Vorkshire and Hampshire and some farmers still rear local (Zo-Vawk) pigs and Burmese breeds. Pigs are reared mostly for meat purpose in this region. But due to intervention of KVK, now farmers adopted pig breeding. Farmers were highly benefitted under the scientific management resulting in an increase in meat production and number of litters per sow.

Salient Features

- Double cropping paddy followed by vegetables
- Water harvesting structures (WHS) for storing water during lean period
- Scientific nursery management
- Introduction of High Yielding Variety of seeds for vegetables
- Scientific rearing and management of piggery and poultry

Shri R. Lalbela (09436756051), Shri Lalrema (09436777223), Shri Lalhminga (09436761863), Shri Lalrinthanga (09436760915), Shri Lawmsanga (09436955152), Shri Lalmuanawma (09863420576), Shri Vanlalrova (09436960195), Shri Laluara (09863435410) are few of the successful farmers of Tuipui D village. With the adoption of IFS by farmers, farming system of Tuipui D village is changing and becoming more productive and profitable.

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Retired Army Man Turned in to a IFS Farmer

KVK Ri-Bhoi, Meghalaya

Shri Kwester Majaw, an army man retired in the year 1983 belonging to Saiden village under Umling block of Ri-Bhoi district adopted Integrated farming System (IFS) under the technical guidance of KVK Ri-Bhoi. He adopted rice, vegetables, pine apple and piggery as components of IFS in his farm of 6.0 ha. Besides he made Jalkund with the financial assistance from NABARD under the technical guidance of KVK for irrigating crops.

He adopted high yielding varieties of rice (Bhalum 1, Bhalum 2, Shahsarang), tomato (Avinash, Chiranjeevi), capsicum (California wonder), soybean (JS - 335), Groundnut (ICGS – 76) and cross breed Piglets (Hampshire) and benefited profoundly. From Shahsarang variety recorded an yield of 40q/ha. From winter vegetables alone, he earned an amount of Rs 95000 in 2006-07. With IFS, his monthly income has increased to Rs 10000 as against he had a tough time to maintain his eight member family of 4 sons and 2 daughters with his lump sum pension amount of Rs 2500 per month.

Salient Features

- Integrated various components in the farm
- Introduced high yielding varieties
- Increased productivity, production and farm income
- Recognized as IFS farmer

Many farmers regularly visit his farm for seeking advices from him. Presently, he is the chairman of Charcha Mandal group. Besides, he is a potential opinion leader in his village.

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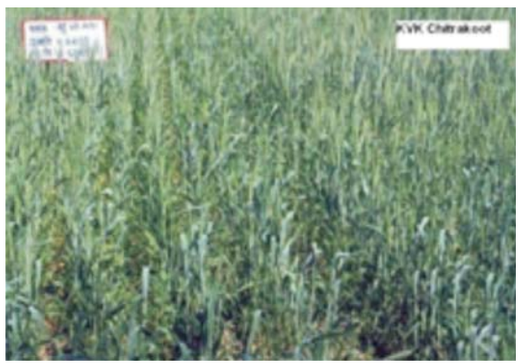
Sustained Agricultural Productivity Under Rainfed Condition

KVK Chitrakoot, Uttar Pradesh

KVK Chitrkoot had started its activities in 12 villages after technological gap analysis through survey. Detailed action plan was prepared including training on latest technologies for crop production, use of bio – manures and balanced fertilizers, seed production of improved varieties suitable for rainfed condition, retention of soil moisture for longer period through green manuring and water harvesting techniques, line sowing and proper placement of fertilizers, crop diversification to ensure income through aonla orchard establishment, vegetable and spices cultivation, goat and fish farming, dairy with improved breeds.

KVK adopted the strategy of peoples participation through formation of different working groups and farmers clubs, village development committee, youth club, women club, village health committee, etc. It was decided that all the programmes and works regarding development of villages would be planned and executed through these committees and clubs. Responsibilities were framed for all-round development of villages- clean and green village, abolition of poverty through increasing production, employment to rural youths good health and education of villagers. Village development committee decided that the seed produced in village will be utilized in villages for its further use as seed on exchange basis. In this way selected villages were covered under high yielding varieties in next season. Major crops and their varieties under seed production programme used were rice (NDR-118, Pant-12, Sonam), pigeonpea (NA-1, Bahar), mustard (Uravashi, Maya, Vardan), gram (KGD-1168, KWR-108), lentil (DPL-62), and wheat (GW-273, WH-147, K-9465). Total seed produced was 210 q in 2007-08 covering 113 villages and 1424 farmers (840 ha area).



Salient Features

- Working through peoples involvement by farmers groups
- All-round development by improving poverty, employment to rural youths, health and education of villagers
- Seed production in village and its utilization for further use as seed in neighbouring villages
- Change in farming system, average productivity increased up to 30-60%.
- Area under improved varieties increased from 9 to 55 % and area under vegetables increased from 2 to 5%

Major outputs in agricultural development were change in farming systems. Prevailing farming system of crop + animals was changed in to a) crop + vegetable, b) crop + fruit + animals and c) crop + animals + fish. Average productivity increased between 30-60%, area under high yielding varieties from 9 to 55 % and area under vegetables increased from 2 to 5%. Common understanding of villagers for health, vaccination, cleanliness and education have improved which has changed the villagers attitude. Area under green fodder has increased. Agriculture and allied sectors productivity and average income have increased. These villages are treated as a model for better agricultural development in the district.

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Multi Layer Horti Based Cropping System for Sustainable Livihood among Tribals

KVK Bastar, Chhattisgarh

Bastar district is situated southern part of Chhattisgarh state. Most of the area (851867 ha) is covered by forest. Rich forest of Bastar has enforced farmers to develop agro- silvi horticultural pattern of farming. In the district, 66% of population is dominated by tribals. Local beverages like Sulfi, Mahua, Landa are taken by tribal and hunting is one of the tradition. Dryland horticulture has tremendous scope for utilization of these land and upland soils by cultivation of suitable Agri-horti crops. KVK introduced Multi layer horti based cropping system in the village Malgaon during 2002-2003. Total area selected initially in the village was 20 ha of upland and number of farmers selected under area was 10. Field crops such as rice, maize, pulses cultivated with horticultural crops like fruits and vegetables round the year and created irrigation facilities through KVK + Convergence Programme (SJGSY) for these crops. Further, KVK organized awareness campaign, training courses, exposure visits, demonstrations and other extension activities for better understanding of technology.

Shri Tulsiram from Malgaon adopted Multi layer horti based cropping system in his 2.5 ha of upland. He cultivated vegetables round the year in *kharif, rabi, zaid* and obtained around Rs 300000 as net income as against Rs 15000 from the same land by mono-cropping with traditional technologies. Consequent years, he strengthened his farm by standardizing various crop combinations to achieve high returns from a piece of land with out affecting soil health under the technical guidance of KVK at regular intervals. His hard work with innovative ideas, Shri Tulsiram received Progressive Farmers Award by IARI, New Delhi and Hon'ble Chief Minister, Chhattisgarh. He is now providing employment to local villagers (2500-3000 man days/year) in his farm. Shri Tulsiram became a Role Model farmer for many farmers.

Salient Features

- Cultivated crops like rice, maize, pulses with horticultural crops like fruits and vegetables round the year for obtaining higher returns per unit area from a piece of land
- Improved soil health
- Generated rural employment
- Improved living standards of tribal farmers

Multi layer horti based cropping system horizontally spread to near by 8-10 villages through the principle of seeing is believing and learning by doing. Area under *rabi, Kharif and* summer crops was increased by 114, 12.15 and 96.52 %, respectively, after six years of implementation of this model in the village. This is due to assured irrigation facilities developed through convergence programmes. Productivity of different agri-horti cultural crops increased between 13 to 84%. Looking to the success of model, Panchyat Bastar sanctioned Rs 20 lakh for development of same model in other villages of Bastar under BRGF scheme. Department of Horticulture, Bastar division also implemented this model in 50% of upland area in the district. Hon'ble C.M., Chhattisgarh state, Hon'ble Vice Chancellor, IGKV, Raipur, and Collector Bastar district awarded and recognized to KVK for the work on dissemination of Multi layer horti based cropping system in the district.

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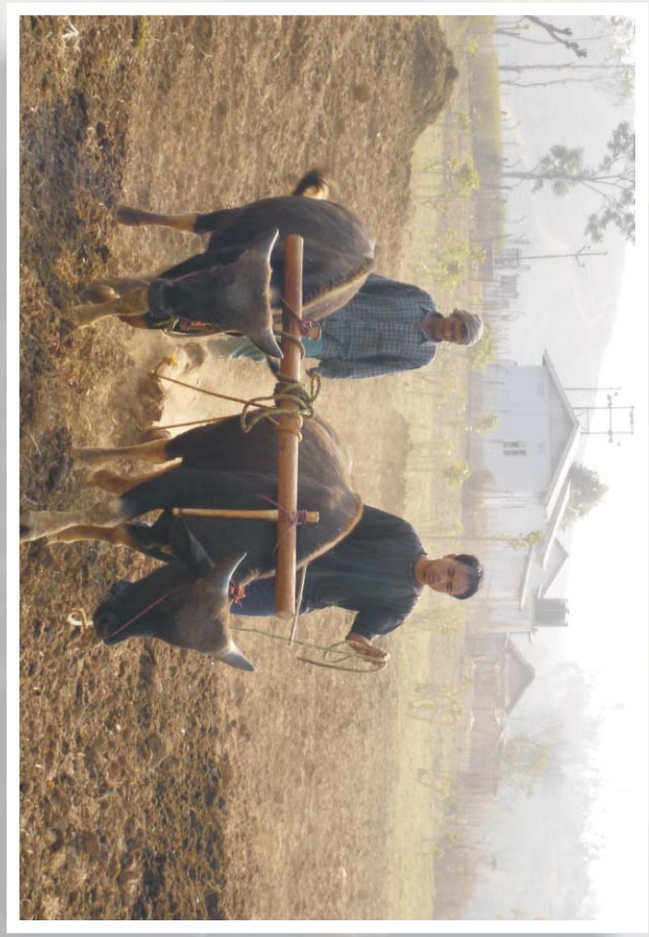

LIVESTOCK AND FISHERIES MANAGEMENT

Vanaraja Introduced in Back Yards

KVK Budgam, Jammu & Kashmir

There was a long felt need among the farmers, farm women and rural youth to start the production of poultry birds in Kashmir valley of Jammu and Kashmir. Backyard poultry is a part of livelihood among the farm women. However, low egg production and lesser weight gain is the major problem in the backyard poultry rearing.

On the basis of surveys, field visits and feedback from farmers and farm women pertaining to backyard poultry and incubation of eggs in local conditions, KVK Budgam initiated the activities to access the better alternative for profitable poultry farming in rural and semi urban areas of district Budgam. Various villages of the district were selected for incubation of poultry eggs. KVK selected two breeds of poultry namely, Vanaraja for dual purpose and local poultry for meat purpose. Two farm families from each selected village were arranged 10 Vanaraja birds for backyard poultry to upgrade the local flock of poultry.

Results of the breed was very encouraging. Vanaraja birds performed better than their local counterpart. Hatchability and survivability in Vanaraja birds were 80 % and 90 %, respectively while in local poultry, they were 60 and 85 %, respectively. Production per unit was also higher in Vanaraja birds, where the average production per unit was 31.36 Kg chicken and 975 number of eggs in comparison to deshi bird (10.2 Kg chicken and 240 eggs). This motivated the farm women to purchase the eggs and chicken of Vanaraja birds. Eggs successfully incubated under their local fowl. Thus, Vanaraja was found suitable alternative to local poultry for rearing under backyard poultry system.

Salient Features

- Introduced Vanaraja birds in Various villages of Budgam district and found eggs were successfully incubated under their local fowl
- Observed more hatchability and survivability in Vanaraja birds as compared to local poultry
- Vanaraja birds gave on an average 3.2 kg body weight/bird as well produced 125-135 eggs/year
- Vanaraja birds found suitable alternative to local poultry for rearing under backyard poultry system

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Tribes Sustained through Broiler Birds

KVK Papum-Pare, Arunchal Pradesh

Agriculture and allied activities are the mainstay of native people of Papum-Pare region and livestock based mixed farming is predominant farming system. Modern agricultural technologies are out of reach for resource poor farmers in the district. Peri-urban areas showed sporadic growth of small scale commercial broiler units but lack of technical know-how and non-availability of quality chicks and high input cost limits their expansion and closure of some of the units. Growing demand is met by importing broiler birds from outside the state.

Since its inception in 2008, KVK Papum-Pare is being carried out the capacity building of farmers in a large way. It has been revealed from post training feedback that the farmers were perceiving technologies and is willing to take up newer ventures for their economic sustenance. But the financial bottlenecks, ready input availability and lack of service supports limits the adoption of technologies. To address these critical points, the Kendra planned and implemented a sustainable model by establishing functional linkage with financial institutes, service providers and farmers groups. A series of activities were organized which includes awareness programme among the farmers for formation of farmers clubs, capacity building programmes and linkage with banks for credit and line departments for service delivery supports. In this model, Kendra had promoted 9 farmers clubs for different agri-allied sector farm activities under the NABARD sponsorship. Out of these farmers clubs, 4 clubs were established broiler poultry farming units on commercial way with flock size of 300-500 birds where 44 (forty four) farmers participated willingly under the technical guidance of KVK. Cost of production was Rs 70.33/kg. Average income per 300 birds/batch was around Rs17 800 and each farmer got a net profit of Rs 1618/ batch. Besides, units served as source of organic manure for crop production which is carried out in the vicinity of farm.

Salient Features

- Conducted feed-back studies
- Farmers clubs were formulated
- Developed institutional convergence model and implemented in collaboration with different stakeholders
- Established functional linkages between scientists, extension personnel, bankers and farmers
- Established poultry units by the farmers willingly
- Poultry farms gave substantial income to the farmers as well as created employment among farm families

Bankers are being pro-active for providing Kisan Credit Cards (KCC) to the farmers club members for taking up commercial ventures under farm sectors in Papum Pare district of Arunachal Pradesh. Iinstitutional convergence developed is a step forward for the upliftment of the tribal socio-economic status through farmers club approach in the district. Model has built the confidence between faculty of KVK, financial institutions (NABARD & APRB) and service delivery support (line department especially AH & Veterinary) that led many farmers coming together in the form of clubs.

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Layer Faming Potential Enterprise in Assam

KVK Jorhat, Assam

There are approximately 4.89 lakh local chicken and 2.37 lakh duck in Jorhat district of Assam with average productivity of 45 eggs per bird producing 51 million eggs per annum. Though a total of 12275 number of improved backyard chicken available in the district, there is a gap of more than 97% between the district demand and local egg production.

KVK Jorhat has introduced commercial layer farming through series of activities. Shri Ranjit Dutta of Teok town in block Selenghat established a commercial layer farming unit under the guidance of KVK. He used the breed VB 380 with deep litter system and Crieston Brown with cage system of housing in 2007. Shri Ranjit Dutta increased birds to 400 in the third batch and earned a net profit of Rs 1 lakh with maximum production up to 90% laying. In the year 2010, he increased his stock up to 600 birds.

Delighted by the success of commercial layer farming using cage system and high market demand of locally produced brown shell eggs in the local markets, many people of Jorhat district are coming from distance places to his farm to buy the beautiful and standard eggs.

Salient Features

- Introduced Vanaraja birds in Various villages of Budgam district and found eggs were successfully incubated under their local fowl
- Observed more hatchability and survivability in Vanaraja birds as compared to local poultry
- Vanaraja birds gave on an average 3.2 kg body weight/bird as well produced 125-135 eggs/year
- Vanaraja birds found suitable alternative to local poultry for rearing under backyard poultry system

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Backyard Poultry Farming Leads to Poverty Alleviation

KVK Rudraprayag, Uttarakhand

Unemployment is the most burning problem of the newly formed state of Uttarakhand. In Rudraprayag district, more than 2/3 population resides in the villages and their main occupation is agriculture and animal husbandry. Small land holdings, scattered land, terrace farming, non-availability of technical know-how, rainfed farming situation, wild animals attack, non-availability of proper market facilities for the end product and typical geographical conditions, etc. makes the farming uneconomical. Seasonal business of serving to the pilgrims of lord Kedarnath and Badrinath is unable to fulfill the annual requirements of people. Many people especially rural youths are unemployed and bound to migrate for employment to metropolitan cities of the country.

During the village meetings it was realized that the youth agreed to start backyard poultry farming for employment. A seven days vocational training course on backyard poultry farming for rural youths was conducted in 2006. During training, practical sessions were conducted on sanitation of the farm and making low cost backyard poultry sheds from locally available resources. Shri Lakhan Singh Rana, a resident of village Bansu, after receiving training from KVK in first batch consulted KVK to start backyard poultry farming in January 2007. He made all necessary modifications in the room under the guidance of KVK and started poultry farming. In the first lot, 100 broiler chicks were reared out of this 95 chicks were sold undressed. A sum of Rs 13500 was earned as gross income from the first lot.

Salient Features

- Introduced poultry farming by KVK through vocation training of days duration
- In the first lot, with 100 broiler chicks farmer earned gross income of Rs 13500
- By seeing the performance, bank extended Rs 60000 loan for expansion of poultry unit run by Shri Lakhan Singh Rana
- A total of 26 backyard poultry units were started by trained farmers of KVK with a flock size of 100 to 300 birds and earning ranges from Rs 8000 to Rs 24000 per each unit

Encouraging gain from the first lot inspired Shri Lakhan Singh Rana for further expanded his poultry farm. He received Rs 60000 from bank for infrastructure and other expenditure related to backyard poultry farming and established a commercial poultry farm. From seeing the success of Shri Lakhan Singh Rana, so far 26 trained farmers started backyard poultry farming at their home with a flock size of 100 to 300 birds and happily earning an income ranging from Rs 8000 to Rs 24000 per flock. Technology exhibited potential for income and employment generation in the rural area.

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Vaccination Against Newcastle Disease Saved Back Yard Poultry

KVK Phek, Nagaland

There are approximately 3.55 lakh poultry birds in Phek district and most of them are being reared as backyard poultry. Flock size of rural poultry varies from 4 to 20 and about 75% of total bird population in Phek consists of nondescript breeds. Majority of farmers in Phek practise mixed farming by raising small stocks. Among small stocks, poultry is most preferred in rural households of Phek because chicken are relatively cheaper to buy and requires less attention and care. Low production performance of local germplasm coupled with traditional rearing practices and high incidence of endemic diseases makes poultry rearing most vulnerable. Newcastle disease proved to be most deleterious disease of poultry and rural poultry suffers a lot due to it. In fact, average poultry bird population per village is1600. Egg production from 480 birds (30% in lay) @ 60 eggs/hen/year is 28800 eggs. Loss in egg production due to Newcastle disease assuming 75.5% mortality is 21720 eggs which costs Rs 86880 (@ Rs 4/egg). Loss due to death of 362 layers @ Rs 80/bird is Rs 28960. Loss due to Newcastle disease outbreaks in remaining 1120 birds assuming 75.5% mortality @ Rs 50 per bird is Rs 42300. Total loss due to outbreak is Rs 158140.

KVK Phek, demonstrated vaccination against the devastating Newcastle disease by involving the women SHGs and rural youths. Estimated average loss due to Newcastle disease before vaccination was approximately Rs 158140/village/year assuming deaths as 75.5% and the loss reduced to Rs 28086/village/year as average death rate after vaccination came down to 13.4% .Thus adoption of vaccination against Newcastle disease has saved Rs 130054/village/year.

Farmers felt that vaccination has reduced the risk of Newcastle disease epidemic. Protection provided to their existing birds through vaccination developed confidence to upscale the production. As it was difficult to arrange the vaccine for 5-10 birds from far away places to the remote villages by individual farmer, trained youths are collecting money from all farmers and regularly vaccinating their flocks.

Salient Features

- Effectively demonstrated vaccination against the devastating Newcastle disease by involving the women SHGs and rural youths
- Average death rate after vaccination came down to 13.4% that saved Rs 130054/ village/year
- Trained youths regularly vaccinating farmers flocks in remote villages
- Protection against Newcastle disease has strengthened the economic status of women as rural poultry is primarily managed by them and it is also providing nutritional security to the house holds

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No Cost Technology for Quail Brooding

KVK Port-Blair, A & N Islands

Quail in Andaman and Nicobar Islands is a household name for dual purpose of egg and meat. Recent studies revealed that blood cholesterol could be controlled by regular consumption of quail egg and meat. This has increased the demand of both egg and meat in many fold not only in Islands but also in mainland. This has created a unique opportunity for Islands women to rear more and more number of quail birds for sale of egg and meat both in Islands and mainland. However, brooding of quail egg is a problem for quail rearers as they have to travel a long distance to reach Central Agricultural Research Institute, Port Blair for hatching through incubator. Average hatchability recorded through incubator was 65 % followed by survivability of 50 % during transport of chicks. In addition, it involves an additional cost on bringing eggs to hatching place and back to rearing place. On the other hand, survival rate of naturally hatched chicks (by hen) was more than 73 % and average hatchability by this means was more than 66 %.

Sensing the benefit of quail rearing vis-à-vis solving the problem of brooding, KVK Port Blair developed a unique idea of brooding quail eggs by hen. In this process quail eggs are kept in a basket with one or two poultry eggs for its brooding by hen. Without identifying the quail eggs, the hen starts brooding the eggs along with poultry eggs. As quail eggs are hatched 2-3 days earlier than the poultry eggs, care needs to be taken to separate quail chicks immediately after hatching to prevent them from stamping by hen. Separated chicks are then kept in a separate container with an electricity bulb fitted nearby to provide required warmth. This practice of brooding by hen has been immensely popular in the Islands and many women are practicing it at their houses. In this process quail eggs hatched during June 2007 to July 2008 by Islands by women recorded 66 % hatching and nearly 74 % survival rate. This no-cost technology has helped a large number of women to earn an additional income from quail rearing in A & N Islands.

Salient Features

- This is absolutely a no-cost technology
- Housewives can easily earn additional income through this practice
- Hatchability and mortality significantly differ than other methods
- Addition of quail egg and meat in daily diet controls blood cholesterol
- Quail egg and meat have high demand

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Piggery as Subsidiary Occupation

KVK Hassan, Karnataka

Since its inception, KVK Hassan conducted various training programmes and demonstrations in the field of Animal Husbandry in general and piggery farming in particular. Shri Nagendra, one of the ex-trainee of KVK, from Dasarakoppalu established piggery unit with an initial investment of Rs 64800 in 2002 without availing loan from any source.

To begin with KVK supplied eight Yorkshire piglets @ Rs 600 per piglet to Shri Nagendra. Interestingly he used only hotel kitchen waste as source of feed and nutrients supplemented by mineral mixture. Thus, he incurred only Rs 30 per day towards fuel to bring the hotel kitchen waste. Every day he used to bring 250 kg of hotel kitchen waste which is sufficient to feed 15 adult pigs and 30 piglets. Besides, he used to get free medicines and B-complex supplements from the Department of Animal Husbandry on free of cost. So far he sold more than 2250 piglets to farmers of Hassan as well as neighboring districts. Benefit Cost Ratio of the unit is 7.35.

According to Shri Nagendra, he uses the leisure time for working in piggery farm and works only for 2 hours a day which does not incur any extra labour charges. Amusingly he started running an auto riksha and pride owner of 3 auto rikshas at present and earning an additional booming income. He is the inspiration behind many farmers for starting the piggery units who have purchased piglets from him and by now at least more than 100 piggery units have been started. Thus, the tangible impact can be seen in the district.

Salient Features

- Shri Nagendra sells 25-30 piglets and 15 adult pigs per month
- Started more than 100 piggery units in Hassan and neighbouring districts
- Pig catcher was modified by KVK was released in 2008 by University of Agricultural Sciences, Bangalore.
- Piggery has improved the socio economic condition of Shri Nagendra in a great extent

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Sweet Potato as Feed for Crossbred Pigs

KVK Ri-Bhoi, Meghalaya

A total of 37688 number pig population is there in Ri-Bhoi district and they feed in three types viz., (i) Scavenging (ii) Feeding of locally available feed resources along with concentrate feed iii) Feeding with recommended/ computed concentrate feed.

Sweet potato in local Khasi dialect is known Phankaro. The Ri-Bhoi district has an area of 157 ha under sweet potato cultivation with a productivity of 36 q/ ha. KVK Ri-Bhoi disseminated sweet potato as feed for crossbred pigs and introduced promising varieties of sweet potato namely ST-14, Meghalaya local and Kokrajhar Red through demonstrations for increasing the productivity and production. A total of 25650 numbers of sweet potato vine cuttings of three varieties were arranged to 10 farmers of 6 different villages of the district. Out of three varieties, ST-14 was found to be performing well with an average yield of 36 t/ha followed by Meghalaya local (31t/ha) and Kokrajhar Red (22 t/ha). Variety ST-14 was adopted by 70-75% in an area of 20 ha in subsequent years.

With supplementation of sweet potato (up to 60%) in the pig ration, farmers saved up to 75% of total feed cost without hampering the production performance of pig. Sweet potato tuber in raw form could be fed to swine up to a maximum level of 40% on DM basis and that boiling of tuber could be fed up to 60% along with good quality vegetable protein (soybean meal) and mineral mixture for economical production. A total of 55 pig growers are now practicing sweet potato as feed and reducing 75% of cost on swine feeding. Production performance of crossbreed pigs in farmers field who fed on sweet potato tubers showed good result and average body weight recorded at 6 months of age was 32.5 kg against 18 kg body weight gain under local feeding practices.

Salient Features

- Introduced promising varieties of sweet potato
- Supplemented sweet potato vine cuttings and tubers in pig ration
- Farmers saved 75 % cost of concentrate pig feed
- Increased body weight of pigs there by gained more income

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Rabbit Farming Provided Dual Benefits

KVK Zunheboto, Nagaland

KVK Zunheboto introduced rabbit breed Newzealand White in Sumisettsu village under Akuluto block of the district Zunheboto for the first time in 2008. As farmers were not aware of the rabbit farming and its meat quality, it gave them a boost and came forward for rearing rabbit on large scale. Since its introduction, a total of 90-100 farmers are engaged in rabbit farming in Akuluto block.

In Nagaland where 100% people are non-vegeterian, there is a scarcity of meat. Introduction of rabbit farming has helped to increase the availability of meat from 47 to 55 gm per day and on an average each farmer could sell rabbit amounting Rs 1000-1500 per month. Many SHGs adopted rabbit farming and gaining dual benefits of meat for home consumption as well as earning additional income by selling rabbits.

Smt Helen (09436203994), Member secretary of SHG from Aotsakili village, Smt Lovini (09615379548), Member secretary of SHG from Shichimi village, Smt Khekhali (09402021128), Member secretary of SHG from Lumami village are some of the SHGs performing rabbit farming very well. Many more SHGs are coming forward to adopt rabbit farming in the district.

Salient Features

- Newzealand white rabbit growth is 10-15g/day
- More number of farmers as well as SHGs came forward for adopting rabbit farming
- Meat availability increased from 47g/day to 55g/ day
- Rabbit farming provided dual benefits of meeting home demand of meat and earning additional income by selling rabbits

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Fish Farming Flourished in Farm Ponds

KVK Washim, Maharashtra

Farm ponds were established for water conservation and water harvesting under National Horticulture Mission in Washim district. Water was available eight to nine months in these farm ponds which is used for critical irrigation. This untapped potential has been utilized for fish farming by the intervention of KVK Washim.

Shri Sambhaji Wankhede, Shri Santosh Gore, Shri Akosh Deshmukh, Shri Vishram Khandare and Dr Sanap, young entrepreneurs, from different villages of Washim district underwent training on fish farming at KVK followed by exposure visit to Andhra Pradesh.

They started the fish farming scientifically in their existing farm ponds with the guidance provided by KVK in the year 2006-07. KVK has arranged Carp as well as Magur fish seed to the farmers. Now they are getting a net profit of Rs 6950 to 19770 on each farm pond with a Benefit Cost Ratio of 2.02 to 3.44. Additional income gained by these farmers has inspired other farmers to take-up up fish farming in their existing feasible 200 farm ponds.

Salient Features

- Farm ponds were basically used for irrigation
- KVK introduced fish culture in existing farm ponds
- Fish farming is flourishing in farm ponds and farmers are gaining additional income
- Now farm ponds are being utilized for dual purpose like irrigation as well as for fish farming

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Farm Women as an Innovative Fish Producer

KVK Jharsuguda, Odisha

KVK Jharsuguda introduced fish farming in the existing farm ponds through a series of activities. Smt Dulukumari Naik, a member of Maa Sarala SHG from the village Durlogaon of the block in Jharsuguda district has 1.6 ha of land, out of which 0.4 ha is pond area. She adopted fish farming in her existing farm pond under the guidance of KVK. She is following the recommended scientific practices in multiple carp culture. She has taken the pre-stocking practices like weeding, removal of unwanted cat fishes application of lime @ 300 kg and cow dung @ 2 t as per recommendations. she has not applied any synthetic fertilizer for plankton growth during the culture practices and any medicine also.

However, as per scientific cultural practices, the feed requirement to get marketable size of fish from 0.4 ha of pond area is 500 kg @ Rs15 per kg along with GNOC and rice bran @ 300 kg each which costs Rs15 per Kg. Thus total feed costs Rs16500 which adds to the production cost. Here, Dulkumari by her personal experience reduces this feed cost by applying 400 kg GNOC and waste of country liquor which is a specific kind of liquor made from rice by the tribals of western Orissa. Cost incurred by applying the GNOC and waste of liquor is Rs 6000 @ Rs 15 per Kg of GNOC there by she reduced the production cost by Rs 10500 with out affecting the marketable size of fish growth. She became member of maa sarala SHG. She was recognized in the district for her innovative idea in the particular field like pisciculture.

Salient Features

- Reduce fish feed cost by preparing her own feed
- Providing nutrition to family
- Enhanced family income
- Enhanced rural employment

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Panchayath Pond as Source of Income

KVK Champawat, Uttarakhand

In the year 2005, KVK Champawat started motivating farmers of the area for scientific fish rearing through trainings and demonstrations. Shri Mahesh Singh Adhikari of village Barakot visited a Panchayath pond of his village, which was being used for the cattle and washing vehicles. He approached KVK for demonstrating fish farming technology. Area of pond was 400 m^2 and pond was situated in middle of village along side road connecting to main market of the block. First time 500 fish fingerlings (2 inch size) of common carp were stocked in the pond in June, 2005. Two months later in August, 700 fingerlings of silver carp and 300 fingerlings of grass carp were also stocked in the pond. Periodically, lime was applied to improve the water quality of the pond by analysing at the interval of every two months and accordingly inputs were used in the pond. Three training programmes were conducted in the village on various practices of fish farming to aware the farmers. Regular field visits of village were made to advice farmers.

After a period of 21 months fishes were harvested in March, 2007. Total of 310 kg fish of 300 to 1200 g size each were harvested. Fishes of less than 300 g (approximately 1-1.5 q) were left in the pond for further growing to marketing size. Total of Rs 4100 were spent on the inputs such as fish seed, fish feed, lime and labour charges and Rs 27900 were earned from the sale of fishes. As a result, village panchayath not only earned net income of Rs 23800 from the pond but villagers also got fresh fishes first time in the area. Now, pond has been given to a villager on lease. In this way, pond has become source of income to lease owner as well as village panchayath and providing fresh fishes to villagers for their consumption. Impact of successful demonstration on fish farming in this panchayath pond is that 15 farmers of the nearby areas have started fish farming in their ponds.

After observing encouraging results more number of farmers are adopting fish farming which is reflected as increase in number of farmers (65 to 180), number of ponds (80 to 215) and fish production (30-35 kg/100m^2 to 50-55 kg/100m^2) within a period of 4 years i.e. from 2005 to 2009. In the district 25 fish farmers have adopted fish-poultry and 12 have adopted fish-duck integrated farming.

Salient Features

- Panchayath pond was effectively utilized for fish farming
- A net profit of Rs 27900 earned by the Panchayath from the existing pond in the middle of the village
- Villagers got fresh fish
- Now Panchayath has leased the pond for fish farming
- Inspired many farmers to adopt fish farming in their existing farm ponds

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Remunerative Composite Fish Farming

KVK Divyodaya-West Tripura, Tripura

Fish is the staple diet for 95% of the population of Tripura. It is bestowed with vast natural water resources along with climatic conditions for fish farming. However, open aqua resources of the state are seasonal in nature. Fish productivity of village ponds was negligible (1.9 t/ha/year) due to lack of scientific know-how and do-how on composite and integrated fish farming.

KVK West Tripura trained farmers and rural youth on composite fish farming. Shri Sagar Deb, who attended vocational training at KVK, has adopted composite fish farming in1.12 ha of water body under the technical guidance of KVK in 2006-07. Technology on stocking density and species combination ratio, fertilizer management, management of diseases, harvesting and stocking manipulation etc were guided by KVK. He harvested average fish yield of 18.75 q/ha as against 11.62 q/ha in previous year without guidance. Shri Deb gained a net income of Rs 242500 and Rs245000 in 2006-07 and 2007-08, respectively, with agricultural crop from the pond embankment. Where as prior to this in 2005-06, without any scientific knowledge and training he invested Rs190000 and received Rs 130000 with a loss of Rs 50000.

Salient Features

- Adopted composite fish culture with proper stocking density, species combination ratio and nutrient management
- Efficiently utilized pond embankment with horticultural crops
- Increased yield 18.75 q/ha as against 11.62 q/ha
- Increased adoption of composite fish farming by 70-80 % among farmers

Composite fish farming in scientific manner is now adopted by 70-80% of the fish farmers, Self Help Groups, Farmers Interest Groups, and Farmer's Clubs in nearby locality and producing required amount of table fish. This has ensured stability in supply and price of different categories of fish in this region and projected per capita availability of 13 kg is going to be fulfilled against the present availability of 9 kg. Efforts are being made to launch a drive for practicing composite fish farming through individual farmers/cooperative groups/SHGs in the village Cerma of Uttar Chebri.

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Fish-cum-Duck Integrated Farming Enriches Rural Women

DRWA Bhubaneswar, Odisha

Directorate of Research on Women in Agriculture (DRWA) introduced fish-cum-duck integrated farming in 27 ponds of individual homesteads and community ownership covering 8.2 ha belonging to 257 women from 9 coastal villages of Puri and Khurda districts in Odisha. Khaki Cambell and Indian Runners variety of ducks were introduced in the system.

Ponds were selected which are away from the rice fields as the ducks have the tendency to enter into the rice field and damage the crop at the harvesting stage. Fish-cum-duck integrated system reduced input cost in term of feed and enhanced production 3.2 t/ha as against 2.0 t/ha with composite fish culture. Besides, generated an additional income through eggs and meat of ducks. Ponds more than 0.2 ha located nearby the household found to be suitable for effective maintenance of 40 ducks by rural women.

Because of social and religions restrictions, only women belonging to Scheduled Caste adopted fish-cum-duck farming. Reason is most of the women belonging to this caste are daily labourers and are willing to do labour. They readily accept the egg and meat of duck, which is generally not accepted by the higher class.

Salient Features

- Fish-cum-duck integrated system is a low input farming
- Efficiently utilized available farm resources
- No/less risk for diversification of farm enterprise
- Provided additional food and income
- Continued supply of wastes from ducks ensures the pond fertilization as well as reduces weed population and there by ensured sustainable production

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Deshi Ducks Improved through Cross Breeding

KVK Purulia, West Bengal

KVK, Purulia as a part of its transfer of technology bid through village adoption programme visited Manikdih village and interacted with the village head and other farmers for launching a number of developmental programmes. This was followed by survey of the village through PRA technique. This survey revealed that a programme on upgradation of deshi duck was initiated by State Animal Husbandry Department, but did not yield any result.

KVK learned in detail about this programme and observed that good number of deshi ducks were available in that village. Further interaction revealed that duck egg and meat have preference among the villagers. Moreover, demand for duck meat touches its peak during a local festival (Manasa Puja) as ducks are offered to Goddess. This revelation prompted the KVK to try upgradation of deshi duck through Khaki Campbell drakes in a phased manner. Thirteen number of Khaki Campbell drakes were arranged for 29 local ducks to start with this programme. Altogether 12 families were involved in this programme. After a span of six months the ducks started lying eggs of 78 gm weight each. This was followed by longer laying period (130-135 days as against 50-60 days for deshi ducks) and brooding of better quality ducklings (51 gm weight of day old duckling against 37 gm of deshi one) with almost nil mortality rate. The gain in body weight was also much better in cross bred ducks (1600 gm in 7 months as against 1025 gm of deshi ducks).

Salient Features

- Improvement of deshi ducks through crossbreeding
- This is a low cost technology
- Breed up gradation is possible with least monetary involvement
- Assured better return in terms of eggs and meat
- Women can practice this technology quite comfortably

Performance of upgraded ducks has helped 12 families earn sizeable additional income both from egg and meat. Price of these eggs is much higher due to its size and weight. Economy worked out by KVK indicated that only from eggs farmers are earning a profit of Rs 330 per duck. As Khaki Campbell is available @ Rs 70 only with State Poultry Farm, Purulia and ducklings do not need any extra care except vaccination against duck plague at 2 months of age, farmers are earning an additional income without incurring an extra expenditure. This low cost technology has been successfully adopted in 23 villages and number is increasing day by day.

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PHT AND VALUE ADDITION

Agro Processing Made Farm Women Self-sustenance

DRWA Bhubaneswar, Odisha

Directorate of Research on Women in Agriculture (DRWA), Bhubaneswar formed a Sangram Vikram Self Help Group (SV SHG) in Keonjar village of Odisha with 14 members of farm women. Group opened a bank account in State Bank of India, Pipili in September, 2002. Group has leased in 0.2 ha of land for a period of 3 years @ Rs 650/year and cultivated vegetables such as tomato, cauliflower, beans, potato and greens and earned a gross income of Rs 1278 with a net profit of Rs 958 within a period of one season.

Further, group members underwent training at DRWA and established a fruit processing unit under the technical guidance of DRWA. Within a year they earned a net profit of Rs 2368 by selling lime and orange squash as well as baddi with black gram. With initiation of the President of group, M/s Hindustan Lever Limited placed an order for 40 bottles of lime squash. This inspired the group to get a loan of Rs 50000 from the State Bank of India for expanding the unit. They prepared 2000 bottles of lime squash and 50 bottles of tomato puree and different types of spices including turmeric powder which was sold in the exhibition organized by Odisha State Government and earned a net profit of Rs 28000. Each member of the group earned a net profit of Rs 900/month. After repaying the entire bank loan, group deposited more than one lakh in bank account of the unit. Group has also ventured in micro-financing and extended Rs 40000 loan to Sarala Self Help Group with 12% interest per annum. Group is continuing with the tie of M/s Hindustan Lever Limited for regular supply of squash.

By retaining Principal amount in bank, the net profit earned was distributed among the group members. This has helped members to improve their status within the family and society. They utilize this money for their children's education, health, household consumption and better nutrition. Now group runs smoothly with more profit because of the efforts rendered by each woman in the group .

Salient Features

- Group members worked with team spirit as well as self confidence
- Group established functional linkage with credit agencies and renowned company for marketing their products
- Developed leadership as well as entrepreneurship among farm women
- Farm women self-sustained through agro-processing technologies

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KVK Palghat, Kerala

Md P. M. Kunhi Mohammed, Padinjarakath House, Poovakkodu, Maruthur P.O., Pattambi belongs to a poor rural family. Md Kunhi Mohammed and his family were struggling to meet their both ends with the meagre wages which he obtained from field work as a farm labourer. His family included aged father and younger brothers. Seeking for a better opportunity, he tried the career of Madrassa Teacher, again to be disappointed, as he could not support his big family. Md Yusuf, his brother who was doing B. Com., dropped the college due to financial stringency. At this juncture, two brothers attended one month training course on processing of fruits and vegetables at KVK, Palghat in 1998. Immediately after completion of the training, they started to produce jam and halwa investing a capital of Rs 3000 which they managed to borrow from friends and relatives. Their venture suffered a set back as the products could not catch the attention of the customers in the market and resulted in a complete loss of their investment.

Though their first attempt gave them a bitter fruit, without losing their heart they took it as a challenge and decided to go ahead with some other products. Thus, they purchased mangoes from their neighbourhood and started producing mango pickles using pickle production technology learnt from KVK. They prepared small polythene packets of mango pickle and marketed in the premises of Vanneri High School at Puthanpalli, Perumpadappa, the main customers being the students. Each packet was sold at Rs 0.50. This continued for two months and they could gain Rs 500 from an investment of Rs 50. With this first success, they got motivated and decided to expand the business.

With this Rs 500 they purchased variety of fruits such as mango, lemon, dates and garlic. They started producing different types of pickles and prepared 250 gm pickle packets. Selling price was Rs10 for all pickles, except for garlic which was sold @ Rs15 per packet. They used bicycle for door-to-door marketing of the products. They were getting a profit of 40% from their value addition activity. In addition they participated in a three days local Vipanana Mela and sold their products. They could gather a profit of Rs 3000 from the sale of pickles in the Mela which increased their confidence. Then, under the technical guidance of KVK, they established pickle processing unit initially at Puthanpalli and gradually shifted to Pattambi with brand name as *Puthuma Achar* with SSI register number 0907/16342. Now they are running the unit in a building of their own. The unit possesses a ginger slicer developed by Md Kunhi Mohammed himself, and also a mixy, an electronic weighing balance and a sealing machine. Products are distributed in neighbouring districts of Malappuram and Thrissur also, for which they purchased 6 carriage vehicles (2 jeeps, 2 auto rikshaws and two wheelers). Presently, there are 22 assistants employed in the unit. Marketing assistants are engaged on 25% commission basis. Puthuma Pickle unit has shown an example of empowerment through value added fruits and vegetables.

Salient Features

- Started pickle processing with an investment of Rs 50 for the production of 10 kg mango pickle and earned an income of Rs 500 in 1998
- Invested Rs 300 for the production of 40 kg pickles of different fruits and vegetables and earned an income of Rs 2000 in 2000
- Invested Rs 10000 for the production of 1000 kg pickles of different fruits and vegetables and earned an income of Rs 40000 in 2005
- Invested Rs 60000 for the production of 3000 kg pickles of different fruits and vegetables and earned an income of Rs 120000 in 2009
- KVK Palghat acts as the king pin behind their escalation

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Value Addition Generated Women Self Employment

KVK Washim, Maharashtra

There was lack of awareness on post harvesting technologies as well as leadership among the SHGs in Washim district of Maharashtra. But KVK Washim successfully introduced value addition and processing technologies that has created employment to members of SHGs. KVK created awareness among 30 SHGs as well as trained their members on value addition and processing of fruits, vegetables, cereals and pulses and also on leadership skills.

These SHGs of 300 women have established home-scale enterprises on banana wafers, potato wafers, papaya tuti fruity, aonla supari, aonla candy, etc. under the brand name SWAMINI under the guidance of KVK . Sales outlet was created for SHG products by NGO on free of cost at Risod which is a tahsil place. As per the record, each SHG member earned on an average Rs 1995/month with the maximum income of Rs 56667/month in case of soya based products from their home-scale units.

Success of above SHG members lead to many women entrepreneurs from other parts of Maharashtra and contacted KVK for training on Vegetable and fruit processing. Two SHGs in Mangrulpir tahsil established home-scale enterprises on banana wafers and soya products. Two SHGs at Malegaon and Krishna village in Washim district established soya processing units. Three SHGs working under SEWA NGO from Ahmedanagar established Agarbatti, candle and chalk making units. Six SHGs from Mothegaon and Ganeshpur village in Washim district established soyanuts and masala and chilli powder making units. Products like soya processing, masala production, turmeric pickle etc., have spread in many pockets of the district. Similarly large publicity through Agro won newspaper has attracted many dealers from Pune, Kolhapaur, Ahmedanagar, Sangamaner, Newasa, Akola and Jalgaon districts of Maharashtra.

Salient Features

- KVK Washim created awareness and capacity building among members of SHGs on value addition and processing technologies
- A total 43 home-sclale processing units were established by women SHGs
- Women members of SHGs got self employment as well as earning additional income in their leisure time at their home through post harvesting technologies

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Income Generation through Value Addition

KVK Hamirpur, Himachal Pradesh

Farming systems of district Hamirpur are mixed and subsistence in nature. Each household in the district is involved in agriculture, horticulture and animal husbandry activities. Participation of women in agriculture and animal husbandry sectors is more than 70%. During lean periods, rural women devote their time in preparing pickles and nuggets (*barian*) at household level as the district has surplus of fruits, vegetables, milk, pulses and cereals. To make such women as rural entrepreneurs, KVK Hamirpur in collaboration with Department of Agriculture and Horticulture organized 7 vocational training courses wherein trained 110 farm women of different Self Help Groups (SHGs) for preparation of various value added products viz. pickles, jams, squash, nuggets (*barian*), vermicelli (*sevian*) and so on during 2001-02 and 2002-03.

A Self Help Group consisting of 20 farm women established an enterprise unit on value addition in 2001-02. Products are prepared almost round the year except dried items like nuggets (*barian*), vermicelli (*sevian*), seera whose preparation is avoided during rainy season. They were not only engaged in value addition but also in cultivation of mushroom because it has to be used as raw in put in their products. In the year 2009-10, members of this group prepared 4 q pickles, 5 q nuggets, 4 q vermicelli, 2 q seera, 1 q Chutneys, 70 kg mango powder, 1 q triphala powder and 1 q amla candy. Group is procuring raw material at cheaper rates during the peak season and available in abundance and preserving and using them on demand basis. Simultaneously, 4 other SHGs established value addition of fruits and vegetables units in the district in 2001-02 and at present about 70 groups are associated with the value addition activity.

Salient Features

- KVK developed capacity building of farm women on value addition
- Farm women formed as Self Help Groups and started entrepreneurship development activities through value addition of fruits and vegetables
- Created round the year on-farm employment among farm women
- Process of entrepreneurship had made farm women self reliant and helped them build up self-confidence
- Each one of the member of SHG earned an additional income through out the year through value added products

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Value Addition Added Income

KVK Delhi, New Delhi

Smt Krishna Yadav, a resident of Rewlala Khanpur village of south west Delhi, was a caretaker of orchards of Ber and Karonda. During an interaction with Subject Matter Specialist of KVK, she came to know about training programmes conducted by the KVK. Being a caretaker of fruit orchards, she attended a training programme on preservation of fruits and vegetables at KVK Delhi during the year 2001-02.

After attaining the training, she prepared 100 kg karonda pickle and 5 kg chilli pickle in 2001-2002, in which an investment of Rs 3000 was made including the cost of raw materials from orchard at market price. Processed products were sold for Rs 5250. This step encouraged her to start home scale processing of fruits and vegetables including karonda. In 2003-2004, she produced 5kg of karonda candy. This produce was new for the area. It fetched good price. Initiative brought confidence on Smt Krishna. Presently she is processing around 500 q of pickles with almost all vegetables and fruits locally available every year. As the scale of production has increased, she is generating about 1500 man days of work/ employment to her neighbours. Products prepared are being marketed successfully in local market by the neighbours. Besides, she has a retail shop for sale of different products prepared by her.

Salient Features

- Smt Krishna Yadav, a caretaker of orchards of Ber and Karonda underwent training on post harvest processing of locally available fruits and vegetables at KVK
- She became as successful entrepreneur by preparing a quantity of 500 q of pickles from locally available fruits and vegetables
- She gave employment opportunities to her neighbours
- She is now running her own retail shop of pickles

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Farm Women Gained Income from Home Scale Processing

KVK Kancheepuram, Tamil Nadu

Problem of lower income in agriculture is due to lack of local value addition. Much of the produce is sold as raw. Value addition is being made at cities and reaching back to the village at a higher price. This can be avoided by setting up value addition facilities at villages and marketing value added products to cities at a higher price. Value addition as a rural enterprise has potential to generate more local jobs, better income and services and reducing rural migration. In this direction, KVK Kancheepuram is working with farm women in formation of SHGs as well as technological backstopping for establishing home scale processing units through various processes including technology standardization, awareness creation, technical and enterprise training, initiating and nurturing income generation activities.

As a result, a total of 25 home scale processing units were established by farm women trained at KVK in the district. Out of which, 7 units on fruit products such as Squash, Jam, 6 units on vegetable pickles, 3 units on milk products, 5 units on masala powder preparation and 4 units on cereal products.The units are selling 60 % of their products to the value of Rs 500 – 1000 directly to consumers by self and remaining 40% selling through hired stages that valued more than Rs1000. Further, KVK helps these units by developing market linkages through various stages like conducting and participating exhibitions/fairs, awareness meetings, sale in the farmers mandies. KVK also providing marketing facilities as arranging weekly bazaar within the premises of KVK. Further, NABARD came forward to assist these units to start Rural Mart at Potheri near KVK.

Salient Features

- Farm women were trained on processing technologies
- Farm women established home scale processing units on various aspects like pickle, fruit products, milk products etc.
- Home scale processing units on average producing products more than 40 kg per month
- Around 60 % of their products are sold by themselves disrectly to the consumers
- Created self employment and gained better income from home scale processing of cereals, spices, fruits and vegetables

Few of the women who run the home scale processing units are Smt M. Kasthuri (09444761776) from Chengalpet, Smt Venkateshwari (09444323912) from Guduvancherry, Smt Shanthi (09094579501) from Kalpakkam, Smt R. Shantha (09884516019) from Potheri, Smt U. Gowri (09444781997) from Konathi in the district . All farm women from these 25 units opined that there was an increased appreciation from family members, friends and relatives, recognition from officials, self satisfaction, freedom from financial insecurity fears and ability to take up new enterprises.

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Dehydrated Mushroom Adds to Income

KVK Malapuram, Kerala

Kerala's hot humid climatic conditions aids in the cultivation of oyster mushroom and milky mushroom with minimal investment in general and Malappuram district in particular as availability of raw material for growing mushroom in the district is fairly good. KVK Malapuram has introduced mushroom cultivation in 2005 through vocational training. Besides this a simple and feasible technology of dehydrated mushrooms developed by Kerala Agricultural University was advocated for extending the shelf life of mushrooms for more than six months. Production of dehydrated mushrooms helped to reduce the weight to one tenth of its original weight enabling ease in transportation. Besides this dehydrated mushroom has the capability for rehydration and regaining its original weight and all other quality attributes in terms of its organoleptic properties. Benefit Cost Ratio for the production of dehydrated mushroom is 3.2.

Several mushroom units were established in the district by both individuals and SHGs under the technical guidance of KVK. Use of perforated plastic containers as an alternate for non degradable polybags wherein harvested 437 g of mushroom from one bucket with BC Ratio of 2.2 which is high as compared to use of poly bags. A total of 10 farmers started production of dehydrated mushrooms in Malappuram district during 2006-07 followed by increased the number to 85 farmers during 2007-08, 285 farmers during 2008-09 and 322 farmers during 2009-10. A total of 966 kg of mushroom produced by the farmers of Malapuram district during 2008-09 and it is increased to 4084 kg during 2009-2010 with that farmers earned an additional income of Rs1.15 lakh and Rs 4.90 lakh, respectively. Mushroom spawn production unit was established at KVK Malappuram with a production capacity of 60 packets/ day. Currently a project of Rs 2.70 lakhs has been sanctioned by SHM for imparting training for farmers in mushroom production, processing and spawn production.

Major mushroom production units in the district are Shri P.V. Dharman (09995062119), Padannavalappil House, Muttanoor P.O, Smt Lathika P.V (0494-2698652), Poochamkunnath House, Kaladi P.O, Smt Sharadha P.I (08086162219), Illathuparambil House, Perumpadappu P.O, Shri Anwar C.P (09809154042), Puthanathani P.O, Shri Shamsudeen P.K (09745127151), Kodakkad House, Vettom P.O., Smt Sheeja C (0494-2631188), Chattikal House, Vettom P.O, Shri Shakir S.P (09947277076), Palliyil House, Puthanathani P.O, Smt Prasanna T.P., Therattil House, Shri P.K.M Abdulkhader, Chemlakath, Edavanna, Shri Kunjupennu, Pulliyur Sreenandanam (0493-3284723), Vattaloor P.O, Kuruva Reshma Mushrooms (09946492711), Kootilangadi and Aiswarya Mushrooms (09946069928), Nilambur.

Salient Features

- Farmers gained skill on dehydrated mushroom production
- Added monthly income of families/ SHGs ranging from Rs 5000 to 15000
- Increased knowledge on nutritional aspects of mushroom
- Group approach enhanced the ability for decision making and social involvement
- Opened avenue for employment generation for rural youth and unemployed women
- Technology is applicable for farmers even with small land holdings

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Tamarind Trees De-mortgaged

KVK Erode, Tamil Nadu

Tamarind trees at Bargur hills of north Erode district could provide a steady seasonal income of Rs 2000- 3000/tree. Shelf life of tamarind is as long as 5 years and trees live for 100 years. Moneylenders advanced loan of a few thousand rupees to tree owners by mortgaging tamarind trees with only one condition that the entire amount would have to be repaid in one lump sum and installments were not accepted. Since more than 20 years, income from trees was enjoyed by money lenders because tree owners did not have capacity to repay the loan in one lump sum. This situation led the tamarind trees to remain in mortgaged with money lenders forever. In this situation, KVK Erode played a crucial role in providing the structure, systems and linkages that enabled the community to explore alternatives to strengthen their self-reliance and improve quality of their lives.

KVK formed people's institutions (Federations of SHGs called Sarva Shakti) in Bargur hills and discussed the issue of the movement for freeing tamarind trees along with 47 other Sanghas in Bargur. It was realized that there is a need for financial support to SHGs in order to release tamarind trees under mortgage. Accordingly, KVK has arranged working capital assistance (as an interest free loan) to some SHGs with the assistance of NABARD's pilot project in 1992. NABARD seed money was used to give loans to SHG members to redeem their tamarind trees in 1993. Except for bank loans accessed directly by individual members, all loans to members came through the Sarva Shakti Federations, the apex bodies of Sanghas organized by Myrada. Sanghas advanced loans to redeem members' trees at a maximum of Rs10000 per member with an interest of 18 % per annum.

Over the years, Federation has accessed loans from local commercial banks, NABARD, Sanghamitra Rural Bank and other financial sources. It has been a long journey since 1993. The movement which was started with two groups viz., Basaveshwara Sangha in Thattakarai and Veerbhadraswamy Sangha in Thamarakarai motivated and enabled 30 groups from 19 villages in Bargur hills to avail loans from Federation and provide financial support to tamarind farmers and the process of redeeming tamarind trees from the hands of money lenders was successfully carried out and totally 455 trees have been released from mortgage. Many trees which were under bondage for more than 15-20 years were freed by this approach which made farmer/SHG members to get relieved from the tiring debts. The family who has de-mortgaged their tamarind trees is now earning an income of Rs 4000-5000/tree/year by selling 200-250 kg processed tamarind. Further, seeds and rind removed during processing are also sold which is utilized for paying the labours of 21 man days required for manual processing that costs Rs1350. Thus, a sour story resulted in a sweet ending with the intervention of KVK.

Salient Features

- De-mortgaged 455 tamarind trees of 30 SHGs groups in 19 villages in Bargur hills and gained an income of Rs15.92 lakh
- De-mortgaged 38 tamarind trees of Tribal SHG Padakal madappa of sholakanai village and gained Rs1.71 lakh in 2005
- Established RURAL MART with the support of NABARD in 2006
- SHGs accessed Rs 29 lakh under SGSY scheme with 50% subsidy component over the 17 years of KVK's active guidance
- Now, not a single tree in Bargur hills is in the hands of money lenders and the people of Bargur

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Kisan Cooker Cheers Farm Women

KVK Gadag, Karnataka

Gadag district is basically a drought prone area. Farm women have to walk 4-5 km as well as spend most of their leisure time for collecting firewood due to scarcity. Because of using traditional vessels and traditional chulha, farm families need high quantities of fire wood (10-15 kg) daily and on an average farm women spend 4-5 hours for cooking in a day. Many research studies have proved that cooking in traditional Chulha for 3 hours a day is equal to smoking of 20 cigarettes per day.

KVK Gadag refined Surakshita cooker developed by Rural Home Science College, UAS, Dharwad in 2002-05 to suit farm women of Gadag district and named it as Kisan Cooker. It has 18 gauze metal (thicker metal) that increases durability for about 10 to 12 years,1000 -1200 gm capacity cooker bowl to suit medium size farm family and round shape bottom edge to catch full fire of chulha as well to enhance fuel efficiency and costs Rs 400/unit. It was introduced to farm women through 20 demonstrations in 13 villages viz., Dundur, Kadadi, Basapur, Asundi, Hulkoti, Kanavi, Hombal, Mallasamudra, Keralli, Harthi, Soratur, Chikkahandigol and Kurthakoti of the district during 2005-06 to 2007-08 and trained 377 members of women SHGs. Further, KVK supplied 129 Kisan Cookers, out of which 71 to KVKs within the state viz., Mysore (10), Raichur (10), Dharwad (10), Koppal (10), Gulbarga (6), Bellary (10), Bijapur (5), Bidar (10), and 5 to Rural Home Science College, UAS Dharwad and 53 to KVKs in other states viz., Pondicherry (10), Kasaragod (3), Thiruvannamalai (10) and Sholapur (30). Besides, 356 Kisan Cookers were supplied to farm women belonging to Gadag, Sirsi, Kumata, Mangalore, Raichur etc.

Salient Features

- Kisan Cooker takes less time for cooking and requires only 0.5 kg firewood/day that costs Rs 2 for cooking
- Kisan Cooker reduced drudgery of farm women while cooking
- With Kisan Cooker 3 food items can be cooked at a time in one chulha
- No continuous attention is required while cooking by Kisan Cooker
- Gives more taste and smell to cooked food through Kisan Cooker

Kissan Cooker saves 2 hours of time, 3 kg of firewood and Rs 12/day which amounted to saving of 2.56 lakh hours of time, 3.84 lakh kg firewood and Rs 5.38 lakh in a year from 356 Kisan Cookers supplied to farm women. This implies medium size family can save 60 hours of time, 90 Kg of firewood and Rs 360 in a month. Few of farm women using Kissan Cooker are Smt Vijayalaxmi Somaraddi from Asundi village, Smt Jayashree Benni from Harti village, Smt Yellavva Basappa Kavalur from Basapur village, Smt Veena Bailey from Hombal village, Smt Kusuma Bhandi from Dundur village of Gadag district. Besides, drudgery in collecting firewood as well as cooking and inhalation of smoke was reduced daily by 2 hours. This made women to feel cheers in Kitchen.

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ENTREPRENEURSHIP DEVELOPMENT

Chawki Rearing Center–A Sustainable Enterprise

KVK Mysore, Karnataka

Sericulture is part of the cultural heritage of Mysore district. Mysore silk is popular world over and has a history of over 220 years. Mulberry, the host plant for silkworms, is being cultivated on an area of 2,371ha in Mysore district contributing to an average yield of 59kg cocoons/100 Disease Free Layings (DFL). Farmers generally purchase worms of about 10 days (2nd Moult) from Chawki Rearing Centers (CRCs) and rear them for the next 30 days to avoid pests and diseases at the very young, vulnerable stage due to poor hygienic condition, especially when the rearing house is part of the farmers' dwelling house. Here, Chawki' refers to the young silk worms reared from hatching to 2nd moult stage. The quality of these chawki worms is the crux of successful silkworm rearing. Despite the fact, there were hardly any CRCs operating in Mysore district until 2006.

With this background, KVK Mysore introduced Chawki Rearing Centers in a project mode in two districts viz., Mysore and Chamarajanagar in 2008. So far, three CRCs have been initiated by the KVK, two in Mysore and one in Chamarajanagar district. All the three CRCs have completed one year of successful operation. Two of the three CRS are being run by farmers' SHGs whereas the KVK is directly managing one CRC. The three CRCs put together generated 2520 man days of employment. With this kind of engagement in CRCs, each SHG member is earning between Rs 1000 to Rs 1500 per month, which works out to a total of Rs 126000 wages earned. It may be noted here that this is an additional income for those involved in chawki rearing since it is only a part-time work for the members that involves about 3 hours of work a day. Further, it has an incremental contribution to silk industry through increased cocoon yield is worth Rs 7800000. This apart, the CRC as a seri-enterprise has witnessed innovations like black-boxing for uniform hatching, institutional innovations like participatory chawki management by farmers' SHGs and use of indigenous techniques in temperature and humidity management.

Salient Features

- CRCs provide healthy 2nd moult worms ensuring better cocoon yield
- By hatching under controlled temperature, humidity and hygienic conditions, the disease incidence on silkworms is reduced significantly
- Additionally, through black-boxing technique, the CRCs ensure uniform hatching of eggs
- CRCs, in the process, save about 10 days of rearing time for farmers thus reducing their overall production cost
- Created a lot of part-time as well as full-time rural employment opportunities among low income families

Inspired by the success of the three CRCs, three more CRCs have already started working, two in Mysore and one in Chamarajanagar district. What is heartening is that the traditional dry land sericulture areas like Kuderu in Chamarajanagar, where sericulture had almost disappeared due to poor monsoon and irrigation facilities, the sericulture enterprise is re-emerging. The success of CRCs is owed to the firm conviction of the host institution JSS Mahavidyapeetha, which believed that this is possible, and hence supported the initiative taken up by both the JSS KVK and an additional effort under the special SGSY project.

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Self Employment by Raising Mango Nursery

KVK South Tripura, Tripura

Agro-climatic condition and hill slope in South Tripura district is very much congenial for successful growing of horticultural crops. Mango variety Amrapali has been found most suitable variety under Tripura agro-climatic condition. Amrapali is a dwarf variety and vigorous type with regular and late bearing. It yields on an average 16 t/ha with 1600 plant population. Demand of mango seedlings in the district is more than 1 lakh per year and production of seedlings and grafted mango are not meeting the demand.

KVK of South Tripura trained rural youth for production of quality planting materials. Among the trainees three school drop outs namely, Shri Priyabrata Datta and Shri Uttam Deb Barma from Takmacherra village and Shri Manoranjan Deb Barma from Manu village of Bokafa Block of South Tripura established mango nurseries at their home gardens with an initial investment of Rs 5000 and now they are earning a gross income of Rs 30000 to 90000 per year. As a result, about 45 youth farmers also motivated and established mango nurseries in the vicinity of KVK. They are producing about 50000 – 100000 mango planting materials every year in the district.

Most important fact is that the family members who used to go outside in search of wages are now engaged in their own farm nursery. Nursery is on small scale, but it has helped in creating an assured employment and raising social value of the rural youth farmers and farm women in the community.

Salient Features

- Established mango nursery units by rural youth
- Nursery units meeting the demand of mango planting material in the district
- Mango nurseries created self employment among rual youth
- Socio-economic status of the farmers improved due to the establishment of mango nurseries

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Nursery Raising Enhanced Farmers Income

KVK Jhunjhunu, Rajasthan

Annual income of small to medium land holders between Rs12000-15000/ ha was too little to provide bread and butter to their families. KVK Jhunjhunu had organised a training on nursery raising for enhancing additional income of desert farmers. One of the farmers, Shri Kripal Singh Dayal of Dayalon ka bas in district Jhunjhunu established nursery unit under the technical guidance of KVK. He planted Ganganagari rose on half bigha land and earned Rs 8000 per month. Merigold cultivated on one bigha land earned Rs 25000 during cropping season. In seven bighas land he raised mother plants of ber, chiku, mango, mausumi, orange, lemon, jamun, pomegranate and rose. In his high tech nursery under net-shade he has grown number of different improved plants, vegetable seedlings and variety of ornamnetal plants using mini sprinkler and drip system.

Department of horticulture, ornamental growers and farmers had purchased plants from his nursery unit which generated a net income of Rs 5 lakh per annum to him. Other farmers with small land holdings got inspired by him and started cultivation of rose and merigold on their fields which raised the income of farmers up to 1.5 lakh per annum. This enabled farmers to provide good education to their children from public schools situated in Jhunjhunu town in addition to livelihood security under limited land holdings. Cultivation of okra after merigold minimized the attack of nematode. Cultivation of seasonal vegetables by buying seedlings from this nursery and other nurseries has increased up to 2 lakh hectare in Jhunjhunu district which enhanced the income of vegetable growers.

Salient Features

- Cultivation of rose and merigold improved the income of small land holding farmers
- Farmers could provide good education to their children from public schools
- Nursery raising adopted by 15 farmers proved an income generating enterprise
- Cultivation of okra after merigold minimized the attack of nematode
- Area under vegetable cultivation increased to 2 lakh ha in Jhunjhunu district

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House Wife Become an Entrepreneur

DRWA - AICRP on Home Science, Odisha

Smt Jyothi Mahipal, 45 years old Commerce Graduate and married women belonged to Koppal District in North Karnataka, received training from AICRP - H.Sc (F & N), UAS, Bengaluru on processing and value added products from ragi (finger millet). As ragi is rich in calcium and good for health, she prepared ragi malt with different flavours, delicious ragi peda using ragi malt powder, halwa, popped ragi snack items, ragi dosa mix and ragi hurihittu with germinated methi powder for diabetics with necessary information on nutrition labeling, packaging, standardization of product and marketing avenues. She is following eco-friendly packaging and providing employment opportunities for rural women. She is marketing her products under a brand name VATHSALYA.

She participated in exhibition organized by the Government of India, food technologists meet, international food product and bakery technology meet and Krishi Mela at UAS, Bengaluru. She sold 150 kg of ragi malt and 50 kg of ragi hurihittu and earned 25% profit in Krishi Mela organized by UAS, Bengaluru at GKVK campus during the month of November, 2006. She received 3rd prize for displaying her products as best stall named Ragi Mane in Krishi Mela, 2007 at UAS, Bengaluru. The participation in these events has given her lot of marketing potentiality, new avenues, and confidence to go ahead with new ventures. She sold her products at local shops at the beginning. Later on products are sold at an outlet in her residence located in Jayanagar, Bengaluru and also in other districts of Karnataka such as Hubli-Dharwad, Koppal and Gadag. Besides, she had tie up with other agencies like Desi, Total Mall, MK Ahmed Retails, Nilgiris and Sun Corporate, Bakers Hut . The profit through the sale of her products is around 40% and her two products peda and chuda is a favorite item for many functions which she prepares on request by the consumers. Presently on an average she is selling 200 kg ragi aralittu, 300 kg ragi malt, 150 kg hurihittu, 200 kg chuda, 300 kg dosamix per month.

Salient Features

- Gained Knowledge and skill on processing and value addition of millets
- Prepared variety of quality and nutritious products from ragi
- Earned 40 % profit by selling the products
- Established linkage with marketing and credit agencies
- Created employment opportunity for rural women
- A house wife become as successful entrepreneur through value added products from ragi

With her confidence, encouragement from family and technical guidance by faculty of AICRP-H.Sc (F & N), UAS, Bengaluru, she has established micro-enterprise on ragi products. Further, Khadi gramodhyog has come forward to finance her for expanding the unit to process small millets like navane (Italian millet), same (Little millet), haraka (Kodo millet) and baragu (Proso millet) as these have good market potential in future. Smt Jyothi has trapped the potential of millets and moving a head to become a successful entrepreneur to reach export market.

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Traditional Phulkari Becomes a Rural Enterprise

KVK Patiala, Punjab

Phulkari is embroidered shawl formerly worn by women of Punjab. It is cultural heritage of Punjab. Phulkari trade was flourishing in Patiala but in an unorganized manner and rural women were merely in status of workers. At this juncture, KVK Patiala organized skill training, capacity building and extension activities for rural women. Having developed confidence among women, they established their own small scale enterprises under the technical guidance of KVK faculty and avoided the exploitation of middle men.

KVK Patiala has been organizing training programmes on Phulkari since 1996. KVK Patiala organized around 2 training programmes on different facets of Phulkari per year benefiting an average of 41 rural girls and farm women. A total of 225 demonstrations were carried out by KVK benefiting 579 farm women and rural girls over a period of fourteen years covering the aspects like block printing and tracing, innovation in base material, traditional pattern and use of beads and sequins. Further, KVK also organized Phulkari Mela on 13.8.2009 and provided a platform for rural women where they could share their views for their upliftment. KVK organized 5 mahila gosthis in different villages of Patiala district in last three years. A total of 56 rural girls and farm women participated in these gosthis. KVK promoted Phulkari as a vocation through different print and electronic media also.

Salient Features

- Entrepreneurs on Phulkari have become role models for fellow villagers
- Rural women and rural girls of the district are getting additional income out of Phulkari craft enterprise
- Many trainees have started their own retail outlets for sale of their products
- Traditional Phulkari become as rural enterprise and created self employment among rural women and girls

In the beginning, majority of trainees adopted it at domestic level. But, later on when the worth of Phulkari craft in terms of profitability was proved, more number of trainees started adopting it at commercial scale. Adoption of Phulkari craft was almost 100 %. On an average the trainees were earning around Rs 50000 per annum if adopted at commercial scale. Even those trainees who adopted Phulkari at domestic level earned Rs. 10000 - 15000 per annum which were being incurred on purchase of Phulkari craft for own use.

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Mushroom Promoted Farm Women Economically

DRWA Bhubaneswar, Odisha

Directorate of Research on Women in Agriculture (DRWA), Bhubaneswar introduced mushroom cultivation in 2007 through training followed by skill demonstrations. It has created an impact on Jai Sriram SGH, constituted in 2006 with 12 members of rural women belonging to Salepur Block of Cuttack District in Odisha. Group established oyster mushroom production unit with 30 beds by an initial investment of Rs 450 at Rs 15 per bed under the technical guidance of DRWA. Unit yielded 50 kg mushroom. Out of which, members of SHG used 30 kg for their home consumption and rest 20 kg sold @ Rs 40/kg in village itself and earned Rs 800 with a net profit of Rs 350.

Members of SHG were exposed to a series of activities such as motivation for group cohesiveness, focus group discussions, exposure to successful units, regular advisory services and sharing of experiences of successful farmers organized by DRWA. Having gained skill and experience on mushroom cultivation by each member of SHG, enterprise has been branched into individual units with 10 - 30 beds. On an average, individual unit has produced 5 kg mushroom and earned an income of Rs 200. There was no problem of marketing as village haat is nearby and also no scope of preservation because of demand for raw mushroom as well no surplus production.

Salient Features

- Enhanced the knowledge and skill of rural women on mushroom cultivation
- Developed leadership and team spirit among rural women
- Social stigma of treating mushroom as non-vegetarian item has been removed
- Established linkage with marketing and credit agencies
- Rural women promoted economically by establishing mushroom units

Smt Sabitri Rout, President of SHG has trained inspired rural women belonging to neighbouring villages viz., Jaripada, Chapada, Safa kanpur, Kochila Nuagaon and Rameswar. A total of 15 rural women trainees from Jaripada village has formed as Sri Laxmi SHG and established a mushroom production unit in a large scale with the financial assistance of Rs 2.5 lakh from Gramya Bank, Tangi. During Tribal Fair of Odisha, Sri Laxmi SHG presented the details of unit in the presence of his Excellency the Governor of Odisha.

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Mushroom Production Opened a New Vista for Better Income

KVK East Sikkim, Sikkim

Sikkim, being the distinctive hotspot of rich biodiversity has served as the habitat of a wide variety of mushroom species (locally called *Cheaoe*), either it is commonly cultivated oyster or naturally grown morsels. Traditionally it is a popular food item of the tribal people. Mushroom production in Sikkim dates back to the late 70's, but lost its momentum due to dearth of knowledge about the distinction between the poisonous and non-poisonous species, improved production technology, availability of quality spawn, processing and marketing. In fact, mushroom production has tremendous potential in Sikkim because of its congenial climate (sub tropical to alpine) and availability of plenty of bio-waste materials.

Initially the KVK has standardized the organic based low cost mushroom production technology and popularised through various activities among the farmers in the district during 2007- 2008. The technology was imparted through skill based training and demonstration on scientific oyster mushroom cultivation and management of spent mushroom beds for vermicomposting. The farm women of Nari Jagaran self help group (SHG) of Rey Mindu village were established mushroom production unit with 10 beds under technical guidance of faculty of KVK during 2008-09. The critical input spawn of *Hypsizygus ulumarius* and *Pleurotus florida supplied by KVK to them.* The unit produced 124.70 kg mushroom with a net profit of Rs.598. Benefit cost ratio was observed to be 2.5:1 which shows its high return efficiency. Being impressed with this result, the women SHG received a financial assistance of Rs.10000 from the State Rural Development Agency, Government of Sikkim and expanded the unit in a large scale with more number of beds.

Salient Features

- Standardized organic based low cost oyster mushroom production technology to suit to the conditions of Sikkim
- Established oyster mushroom production units with low initial expenditure
- It possesses highest bioconversion ability i.e. more than 60%.
- It thrives well in the moderate range of temperature 20-30 ^{0}C with 80-85% humidity
- Production was taken almost year round (10 months)
- Created self employment and additional income

Smt. Shanti Lepcha (9775476307) , Smt. Kesang Lepcha (9775960622) from Rey village, Smt. Bina Subba (09474356998) , Smt. Sharmistha (9733301921), Shri. Sonam Bhutia, women of Ujjala SHG from Ranka village are some of the successful mushroom growers of the East district of Sikkim. They are growing mushroom successfully round the year except during extreme cold at household level with minimum use of resources. Marketing of mushroom made easy as it is the part of the food habit of the people. Commercial oyster mushroom cultivation has become the talk of the day and the technology has been spread to the other districts of Sikkim like North, West and South Sikkim.

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Milky Mushroom Empowered Rural Youth

KVK Villupuram, Tamil Nadu

KVK Villupuram introduced milky mushroom cultivation among 1200 unemployed rural youth in 2009. They formed as eight registered associations viz., Arokya Milky Mushroom Growers Association (AMMGA-E), Eruddayanpattu, Marutham Milky Mushroom Growers Association (MMMGA), Erukalankuritchi, Bismi Milky Mushroom Growers Association (BMMGA), Tindivanam, Hitech Milky Mushroom Growers Association (HTMMGA), Navammal Kapper, Mazhaithuli Milky Mushroom Growers Association (MMMGA), Valavanoor, Annai Milky Mushroom Growers Association (AMMGA), Molassur, Pasun Thalir Milky Mushroom Growers Association (PTMMGA), Kattuchiviri, Arokiya Milky Mushroom Growers Association (AMMGA-C), Chinnakallipattu. KVK conducted 55 repeated and intensive training courses on commercial production of milky mushroom and its spawn for the members of these eight Associations and also sensitized them for bank loans and market avenues.

Production of milky mushroom by these Associations ranged from 95 Kg to 1200Kg/annum. They sold mushrooms to the consumers through direct sales at farmers market and through door delivery to apartments and quarters @ Rs100/ kg. BMMGA produced value added products from mushrooms such as mushroom soup, mushroom samosa, mushroom chappathi, chilli mushroom and mushroom manchurian. But, PTMMGA produced only mushroom soup. On an average 600 soup packets were produced per month by BMMGA and earned an income of Rs 435000 where as PTMMGA earned an income of Rs 23000. Eight Associations viz., MMMGA, BMMGA, HTMMGA, AMMGA-E, MMMGA-V, AMMGA, PTMMGA and AMMGA-C earned a gross income of Rs124600, Rs 555000, Rs 302500, Rs 94060, Rs 83400, Rs 52300, Rs 62000 and Rs 9500 per year, respectively. To be as a self sustainable milky mushroom production unit, these Associations have produced 35 to 150 culture tubes and spawn on their own. Further, mother spawn was also produced by all of them using sorghum as raw material. Bed spawn production by these associations ranged from 475 to 4000 numbers. HMMGA produced 42 t of vermicompost during 2nd year as a product of value addition of mushroom spent waste, which remains as residue after mushroom cultivation. Milky mushroom cultivation further spread among 1875 rural youth belonging to Chennai, Villupuram, Cuddalore, Trichy, Perambalur and Ariyalur districts of Tamil Nadu through organization of skill training courses by these eight Associations.

Salient Features

- Identified willing unemployed rural youth and mde them to form as registered associations.
- Extended technical guidance and support to the members of eight associations through the funds from the Ministry of Science and Technology, DBT, Government of India, New Delhi
- Annual gross income earned Associations ranged from Rs 9500 to 555000
- Developed entrepreneurship among unemployed rural youth and farmers

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Tribal Women Sustained Livelihood through Mushroom

KVK Hazaribag, Jharkhand

Hazaribag district is congenial for mushroom production throughout the year except the months of May and June. Mushroom is preferred by all the community of the district. KVK Hazaribag introduced mushroom cultivation as an enterprise for sustainable livelihood option for tribal women by motivation, persuasion, interaction and arousing interest in them through their visit to mushroom production unit of the KVK. Initially 28 tribal women from four different villages were imparted training on mushroom production for three days at KVK. In place of certificate the women were provided with 20 medium size bags of spawn to start production in their houses with locally available materials. Entire process from unit establishment to harvesting of mushroom was supervised by KVK. Women produced 224 kg mushroom and sold in the local market @ Rs 35 per kg.

Success of women prompted 1026 tribal women to under go training on mushroom cultivation at KVK. Within five years, KVK has arranged 4730 kg spawn to the ex-trainees as well as other farmers who adopted mushroom cultivation in their back home situation. Mushroom cultivation has provided alternate income and self employment to tribal women of Hazaribag. Mushroom cultivation has been spread to aspiring farmers of both men and women from other districts of Jharkhand, Bihar and West Bengal and they are regularly approaching KVK for technical guidance. Development department of Hazaribag has provided mushroom shed to all the women who had undergone training at KVK. Endeavour of KVK proved very effective in providing sustainable livelihood to the tribal women of Hazaribag.

Salient Features

- Mushroom is a preferred food item in Jharkhand
- Mushroom production is a low cost technology
- Women can produce mushroom at household level with locally available resources
- It has the potentiality to offer additional income and employment to tribal women of Jharkhand
- KVK as a facilitator can boost up the women to produce more and more mushroom

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Mushroom Production at High Altitude Areas

KVK Phek, Nagaland

Phek district is rich in natural flora and fauna. Climate suits well to oyster mushroom production as it grows well at moderate temperature ranging between 22 to 25°C with 55 to 70% humidity. It can be grown round the year, except during extreme cold months, at household level with minimum inputs. Marketing of the produce is also not a problem as mushrooms are part of the food habit of tribal people.

Considering all these facts, KVK Phek disseminated cultivation of oyster mushroom among farmers of the district. KVK trained 70 farmers from five different villages during 2007-08. Six trainees from Pfutsero village, 3 from Porba, 2 from Pfutseromi, and 2 from Sakaraba village have established mushroom production units. Mushroom produced by the villagers other than Pfutsero and Pfutseromi villages was primarily consumed by boiling with other vegetables and meat (70%) or frying (10%). In some cases they dried the mushroom and preserved (20%). However producers of Pfutsero and Pfutseromi villages could sell about 70% of surplus produce.

Shri Lhiwepre Ritse (09436010213) of Pfutseromi village, who received training in the first batch, could earn Rs 4500 for a batch of thirty bags having 2.5 kg paddy straw as substrate on an expense of only Rs1805. Overall production from adopted villages recorded 812 kg in 2008-09. It has increased to 1060 kg in 2009-10. After seeing the success of these units, farmers from Gidemi, Kikruma and Zellome villages were encouraged to establish mushroom production units.

Salient Features

- Climate of Phek region suits well for oyster mushroom production
- Introduced mushroom cultivation and farmers came forward to establish mushroom production units
- Shri Lhiwepre Ritse could earn Rs 4500 for a batch of thirty bags on an expense of only Rs 1805.
- Overall production was recorded 812 kg in 2008-09 that has increased to 1060 kg in 2009-10
- Now mushroom cultivation is being spread to other villages

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Rural Youth Self Employed through Apiculture

KVK Baran, Rajasthan

Unemployed youth of Baran district were highly frustrated and proved burden on the parents having meager earning from traditional farming. Some of the youth migrated to cities for getting job but high living cost and job availability forced them to return back to their villages. Parents contacted KVK, Baran for guiding their children in new income earning activities related to agriculture. Then KVK conducted a pre-survey to judge the education and knowledge level of rural youth on which basis a training programme on apiculture technique was developed with an aim to provide employment opportunities for their livelihood security in rural area of Baran district.

KVK organised a 30 days training for unemployed youths on apiculture during December, 2008 and upgraded their knowledge from time to time through scientists- farmers interface. Nine youth started an enterprise on apiculture. Initially 100 boxes were arranged to them under the National Horticulture Mission scheme on 50% subsidy in 2009. Later 50 more boxes were added. Based on flowering cycle of crops like mustard, corriender, sufeda, litchi, bajra, cotton and sunflower, they have shifted/migrated the bee hives from Baran district to villages of Punjab and Haryana. Gross income from apiculture unit was Rs.13.1 lakh and they got a net profit of Rs 7.5 lakh by the end of April 2010. Each unemployed youth earned around Rs 83000 within a year. Unemployed youth of other villages of Baran district got motivated and obtained training on apiculture from this group of entrepreneurs under the supervision of KVK Baran. They have submitted applications to NHM for establishing their own apiary units. This venture has not only enhanced the income of rural youth but also established them as a inspiring educated rural youth in apiculture enterprise.

Salient Features

- KVK introduced apiculture as an enterprise among rural youth
- Nine members rural youth adopted apiculture as an entrerprise and established 150 boxes apiary with the asistance of NHM and technical guidance of KVK
- Each member of group earning Rs 83000 per year
- Crop growers of Punjab, Harayana and Baran district were benefited by bee cross pollination.
- Provided quality honey to various firms including Khadi and Village Industries
- Youth migration from villages to cities halted

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Bee Keeping made Farmer as Entrepreneur

KVK South Sikkim, Sikkim

Honey bees are one of the most well known, popular and economically beneficial insects. For thousands of years, man has plundered colonies to get honey. Now honey bees are kept in artificial bee hives throughout the world. Many people make it a living from bees, most keepers are hobbyist who have only few hives and who simply enjoys working with these busy and fascinating insect.

In March 2007, when officials of KVK of South Sikkim surveyed all the villages surrounding Namthang area to see the farming system adopted by the farmers, before starting the functioning of the Kendra and visited the farm of Shri Bal Bahadur and learnt that farmers of Namthang area are interested in Apiculture, incase proper training and guidance are provided to them. KVK conducted a workshop to find out the prospect and constrains of bee keeping in Namthang area. Sixty farmers attended training. Later in the same month KVK conducted four days training on bee keeping with the support of resource person from State Institute of Rural Development (SIRD) at its campus. After the training Shri Bal Bahadur was in constant touch with KVK and established bee colonies in 2007 and sold first harvest of honey worth of Rs 6000. In the second year, he expanded his colonies with eight boxes at subsidized rate from Horticulture Department. By the end of 2008, he sold Rs 12000 worth of honey and Rs 20000 worth of colonies to Science and Technology Department through KVK. In the third Year up to June 2009 he has sold honey worth Rs17000 and has kept colonies worth Rs 100000 ready for sale to Science and Technology Department.

Salient Features

- Shifted bee colonies from wooden log to scientific bee boxes
- Rapid multiplication of colonies through scientific method
- Gained good market
- Increased crop yield and improved quality of produce due to cross pollination by honey bees near by fields
- Farmer became an entrepreneur through bee keeping

Recently, Shri Dawcho Lepcha, Hon'ble minister for Food Security and Agriculture Development, Horticulture and Cash Crop Development and Irrigation and Flood Control Department, along with the other senior officers of both Agriculture and Horticulture visited his bee colonies. Hon'ble Minister was impressed with his work and gave him cash prize. For Bal Bahadur it is an additional income without any land requirement and time except for proper vigilance at times for pest. KVK South Sikkim envisages to make Namthang a honey belt from a dry belt of South Sikkim.

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A Tribal Farmer Becomes a Successful Bee-Keeper

KVK Ranchi, Jharkhand

Shri Taleswar Mahato, a tribal farmer from 16 member family of Kharkhutoli village, Ranchi used to work hard in his 3.2 ha land to feed the family members. As mostly of his land was rainfed upland in nature, other members of the family had to work as agriculture laboures in others field for sustenance of the family as the productivity was very low.

Shri Mahato enrolled his name for training on bee-keeping offered by KVK for duration of one month. With utmost sincerity and dedication Shri Mahato successfully completed the training and he started bee-keeping with two Italian bee boxes under the guidance of KVK faculty. This was the beginning of the end of his plight. At the end of the same year he multiplied the bee-colony from 2 to 4 with production of 140 kg honey that fetched him Rs 9800.

Then he started increasing the number of colony as well as selling out old colonies to earn dual income from colony and honey. In the next four years total income earned was Rs 290700 by selling 34 bee-colonies @ Rs100 and 1710 kg honey @ Rs170 per kg. He invested his earning for better return from agriculture like digging two dug wells for irrigation, application of bio and organic fertilizer, improved seeds of vegetable, cereals, pulses and oilseeds. Diversified income from bee-keeping and agriculture has helped Shri Mahato to improve the socio-economic status of his family in that area.

Salient Features

- Honey has considerable market demand
- Bee-keeping is becoming popular among youths
- Proper guidance can make this enterprise a lucrative one
- Return from apiary is almost certain
- Bee-keeping can be taken up throughout the year

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Bee Keeping – As Subsidiary Enterprise

KVK Mohindergarh, Haryana

Economic status of farming community in Mohindergarh district of Haryana is relatively poor due to the small land holdings of the farmers. Declining water resources have further restricted the options of the farmers for adopting diversified irrigated cropping systems. Under these circumstances, farmers of this area have no other option but to adopt subsidiary occupations. On exploring various possibilities in year 2003, bee keeping seemed to be a good option because mustard is the major *rabi* crop of the region.

Then KVK Mohindergarh introduced scientific bee keeping in the district through organizing vocational training courses. A total of 528 farmers have been motivated towards setting up of bee keeping units in the year 2004 and subsequent years. At present, 105 beekeeping units have been established by the trainees of KVK in 22 villages. One of the problems faced in running the bee keeping units was to make arrangement of flora in dearth period (June-Sept) and it was overcome by migrating the bee colonies on hilly areas of Haryana, Punjab and Himachal Pradesh during this season. For easier management farmers were advised to form clubs. Farmers started migration of bee colonies which facilitated the adoption further. In the year 2009, 3060 q honey was produced from 7650 bee colonies. Large scale adoption of bee keeping was the result of proper follow up of trainees in the field by KVK.

Salient Features

- Bee keeping does not compete with other agricultural enterprises for resources
- Heavy initial investments not required.
- Recurring expenditure also is negligible
- Requires simple equipments and thus provides rural employment for their fabrication
- Migration of bee colonies during dearth period is the key for success
- Pollination by bees improves the quality and quantity of the crop produces

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