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.

Dr Sheeba Rabecca Issac
Programme Coordinator
Krishi Vigyan Kendra
Sadanandapuram PO, Kottarakara
District Kollam - 691550

Email: kvkkollam@yahoo.com
drsubaidabeevi@gmail.com
Ph: 0474-2459388
Fax: 0474-2459388

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

Dr A. K. Mohanty
Programme Coordinator
Krishi Vigyan Kendra East Sikkim
ICAR Research Complex for NEH Region
Ranipool, District East Sikkim-737135
Email: dramulyakumar@gmail.com
akmohanty2004@yahoo.co.in, east sikkimkvkicar@yahoo.com
Ph: 03592-251311
Fax: 03592-251311
Ph: 03592- 231274 (R), M: 09434750778

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.

Dr Anina Susan Zachariah
Programme Coordinator
Krishi Vigyan Kendra, Mitraniketan P.O.
Vellanad, District Trivandrum-695543

Email: aninasz@yahoo.com
trivandrumkvk@yahoo.co.in
Ph: 0472-2882086
Fax: 0472-2882086
Ph: 0471- 2552213 (R), M: 09447741347

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.

Dr T. Senguttuvan
Programme Coordinator
Krishi Vigyan Kendra, Needamangalam
District Thiruvarur-614 404

Email: kvkndm@tnau.ac.in
senguttuvant@yahoo.co.in
Ph: 04367-261444
Fax: 04367-260666
04362-246980 (R), M: 09443450818

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

Mr N. Ramesh Raja
Krishi Vigyan Kendra, Kilnelli village
Chithathur PO, Cheyyar Taluq
District Thiruvannamalai-604410

Email: vedapurikvk@gmail.com
Ph: 04182-293484
Fax: 04182-201525

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

Dr C.P. Robert
Programme Coordinator
Krishi Vigyan Kendra, Kolabhagom P.O.
Thadiyoor, Tiruvalla
District Pathanamthitta-689545

Email: cardkvk@yahoo.com
Ph: 0469-2662094/2753383
Fax: 0469-2662094
Ph: 0469-2753382 (R), M: 09847298918

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.

Dr Ravi. C. Deshmukh
Programme Coordinator
Krishi Vigyan Kendra, P.O. Box 58
District Bidar-585 401

Email: kvkbidar@rediffmail.com
Ph: 08482-244155
Fax: 08482-244155
Ph: 08482-225830 (R), M: 09480696318

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.

Dr Arvind Kumar Singh
Programme Coordinator
Krishi Vigyan Kendra
P.O. Manpathar, Birchandramanu
South Tripura-799144
Email: singh_ak30@rediffmail.com
icarkvk_stripuraa@rediffmail.com
kvksouthtripura@rediffmail.com
Ph: 03823-252523
Fax: 03823-252523, M: 09856033391

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

Dr S. Nimaichand Singh
Programme Coordinator
Krishi Vigyan Kendra, Thoubal
Wangbal Rice Research Station
Director of Agriculture, Govt. of Manipur
District Thoubal-795001

Email: kvkthoubal@gmail.com, onobo.singh@gmail.co
Ph: 03848-201559
Fax:03848-201559

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.

Dr Nikulsinh Madhusinh Chauhan
Programme Coordinator
Krishi Vigyan Kendra
Navasari Agricultural University
Unai Road, Vyara, District Tapi,Gujarat, India

Email: kvkvyara@yhoo.co.in
Ph: 02626-221869
02626-221869/220212
M: 09427868668

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.

Dr Mohd Amin Zargar
Programme Coordinator
Krishi Vigyan Kendra, Pombay
Anantnag-192101

Email: kvkanantnag@rediffmail.com
Ph: 01931-213492
Fax: 01931-213492-228346
Ph: 01931-213492 (R), M: 09906616078

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

Mr A.S. Singh
Programme Coordinator
Krishi Vigyan Kendra
Tura, Sangsangiri, P.O. Dobasipara
District West Garo Hills-794005
Email: shyam_westgaro@rediffmail.com
kvk_tura@yahoo.com
Ph: 03651-222535
Fax: 03651-222535
Ph: 03651- 223723 (R), M: 09436112118

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

Dr Satish Kumar
Programme Coordinator
Krishi Vigyan Kendra, Rice Research Station
Nagina, District Bijnour-246762
Email: sathish.nagina@gmail.com
Ph: 01343-250489
01343-250489
M: 09412311504

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.

Shri A. Ramamourti
Programme Coordinator
Krishi Vigyan Kendra, Kurumbapet
Puducherry-605 009

Email: pondicherrykvk@yahoo.co.in
Ph: 0413-2271352/2271292
Fax: 0413-2279758
Ph: 0413-2206666 (R), M: 09443235329/09442502109

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.

Dr Praveen Kumar Singh
Programme Coordinator
Krishi Vigyan Kendra, Numaish Camp
New Gopal Nagar
District Saharanpur-247001

Email: saharanpurkvk@gmail.com
praveen_1966@yahoo.com
Ph: 0132-2664480
M: 09411078115

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

Dr Sunil Kumar Paul
Programme Coordinator
Krishi Vigyan Kendra, Bongaigaon
P.O. Kajalgaon, District Chirang-783385

Email: kvkbngn@gmail.com
Ph: 03664-243775
M: 09435120552

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.

Dr Sarat Saikia
Programme Coordinator
Krishi Vigyan Kendra, Dhubri, AAU
Bilasipara, Satber
Bilasipara Ward No. 6
P.O Bilasipara (P.B. No. 1)
District Dhubri-783348
Email: sarat-hort@rediffmail.com
Ph: 03667- 250083

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

Dr Tribhawan Singh
Programme Coordinator
Krishi Vigyan Kendra, Krishi Bhavan
Politechnic Chauraha
District Jaunpur-222002

Email: kvkjnp@rediffmail.com
drsingh_2009@india.com
M: 09450575746

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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Dr Jagdish Grover
Programme Coordinator
Krishi Vigyan Kendra
Kheri, District Sangrur-148001

Email: isingh2060@gmail.com
Ph: 01672- 245320
Fax: 01672- 245320
M: 09465821922, 09855321902

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

Dr Sunil Kumar Paul
Programme Coordinator
Krishi Vigyan Kendra, Bongaigaon
P.O. Kajalgaon, District Chirang-783385

Email: kvkbngn@gmail.com
Ph: 03664-243775
M: 09435120552

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

Mrs Sherab. L. Dorjee
Programme Coordinator
Krishi Vigyan Kendra, South Sikkim
Namthang, District South Sikkim-737137

Email: kvknamthang@gmail.com
Ph: 03592-241398
Fax: 03592-241398
M: 09434382519

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 %

Dr Amal Chandra Sharma
Programme Coordinator
Krishi Vigyan Kendra, CRS Campus
Gelapukhuri Road, District Tinsukia-786126

Email: amalchandra_sarmah@yahoo.co.in
Ph: 0374-2300768
Fax:0374-2300768
M: 09435523760

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.

Dr Arun Balamatti
Programme Coordinator
Krishi Vigyan Kendra, Suttur, Taluq Nanjangud
District Mysore-571129

Email: jsskvk_1994@rediffmail.com
Ph: 08221-232218
Fax: 08221-232377
M: 09448832186

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

Shri Sujan Biswas
Programme Coordinator
Krishi Vigyan Kendra, UBKV
Pundibari P.O.
District Coochbehar-736165

Email: tsamajdar@rediffmail.com
Ph: 03582-270587
Fax: 03582-270587

Leaf Colour Chart Minimised Over Dose of Nitrogen

KVK Sangrur, Punjab

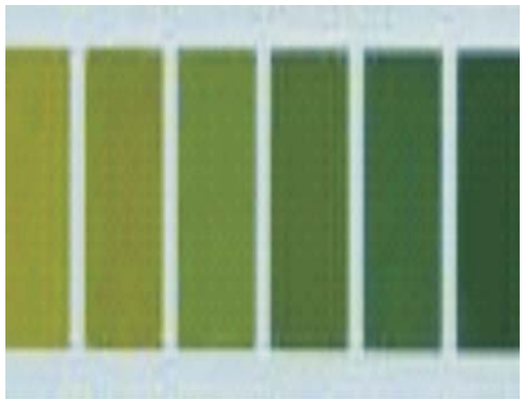
Leaf colour chart (LCC) is the recommended technology for applying proper dosage of nitrogen to rice crop. It has been seen that the farmers apply more doses of nitrogenous fertilizer beyond the recommended limits. They are also unaware of the adverse effects of indiscriminate use of nitrogenous fertilizers 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



Dr Jagdish Grover
Programme Coordinator
Krishi Vigyan Kendra
Kheri, Sangrur-148001

Email: isingh2060@gmail.com
Ph: 01672-245320
Fax: 01672-245320
Ph: 09465821922
M: 09855321902

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

Dr Om Parkash Mehla
Programme Coordinator
Krishi Vigyan Kendra, Damla
District Yamunanagar-135001

Email: sckvkynagar@gmail.com
Ph: 01732-282737
Fax: 01732-228962
Ph: 01744-291855 (R), M: 09896719311

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.

Shri Raju. G. Teggelli
Programme Coordinator
Krishi Vigyan Kendra, Aland Road
District Gulbarga-585101

Email: kvkglb.in@rediffmail.com
Ph: 08472-274596
Fax: 08472-241766
M: 09480696315

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

Dr Sada Nand Rai
Programme Coordinator
Krishi Vigyan Kendra
Vanvasi Seva Kendra, Adhaura
District Kaimur-821116

Email: vanavasi@sancharnet.in, vsk.adhaura@yahoo.co.in
Ph: 06180-269220/269230
Fax: 06180-269230
Ph: 06180-269220 (R), M: 09430567345