Ail Cultivation (cultivation on land embankment) for profitable agriculture

The so-called *Ail* is the land embankment, which is made to demarcate a given land. This demarcation is made to consider the land with individual ownership. Traditionally, the width and height of this *Ail* remain upto 40 cm and 30 cm respectively (Fig. 1). In Sundarbans, it is usually noticed that the depth of water on the low land become 2½ ft. to 3 ft. during rainy season. Only long duration traditional paddy is grown in the low land situation keeping the *Ail* fallow. No vegetable crops are possible in this land situation during rainy season and as the optimum moisture condition of the soil comes in too late, it is not also possible to grow any vegetable during winter season. Besides, source of sweet water for irrigation is minimum to irrigate the winter vegetables. For productive use of the *Ail*, KVK conceptualized and modified the width and height of this *Ails* upto that level where vegetables can be grown both in rainy and winter seasons. To overcome the inundation problem during rainy season, the height of the *Ail* was raised upto 1 meter. keeping the low land paddy field aside. The width of the top of the *Ail* is made 90 cm where base remains 150 cm (Fig. 2). The transverse section of this modified land embankment would be like a trapezium, which is required for strengthening the structure.

Fig. 1. Traditional land embankment (Ail)

Fig. 2. Modified land embankment (Ail)

To make a raised land embankment along the circumference of 1 ha (10,000 sq. meter) land, having 400 running meter *Ail*, it requires 480 cubic meter soil. This volume of soil is collected by making a trench surrounding the *Ail* or by digging a small sized pond of about 24 meter length, 10 meter width and 2 meter depth within the paddy field itself. The trench (Fig. 3) so developed is utilized for harvesting of rain water for life saving irrigation of the vegetable crops grown on the *Ail* during winter season. The pond excavated (Fig. 4) within the paddy field for construction of *Ail* is used for pisciculture also. As paddy-cum- fish culture is a popular practice here, the fish takes shelter in that pond when the water of the paddy field becomes insufficient or dry up. During rainy season, as the height of the *Ail* is more than that of the existing field, there is no chance of damaging the vegetable crops on *Ail* by

submersion. In this way, the *Ail* can be developed in any land irrespective of its size and high value vegetables can be grown throughout the year. Once a raised *Ail* is developed, it lasts for about 8-10 years without incurring additional expenditure to great extent and only periodical repairing of the structure is required as and when necessary.

Fig. 3: Irrigation water harvested in the trench for tomato cultivation during winter season

Fig. 4: Water harvested in the pond for irrigation of winter crop and fish cultivation

Cropping pattern and cultivation procedure:

Cultivation on the land embankment (*Ail*) starts from the month of June each year just before the onset of monsoon. During rainy season, crop like okra (Fig. 5), bitter gourd (Fig. 6) etc. and during winter season tomato, french bean (Fig. 7) etc. are cultivated on the land embankment. The land preparation starts from the second week to last week of May. After digging the soil with spade, well rotten manure mainly FYM is applied over the soil. Weeding, if needed, is done before the preparation of the soil. Then two rows of pits are made along the length of the *Ail*. The rows are made 60 cm apart from each other and the pit to pit distance varies according to the crop to be grown. Normally, 15 cm space is left on the both outer sides of the rows. The soil of each pit is mixed with *Trichoderma viridi* or *T. harzianum* and *Pseudomonas fluorescens* @10 g each per 1 kg organic manure.

Fig. 5: Okra cultivation on *Ail* during rainy season

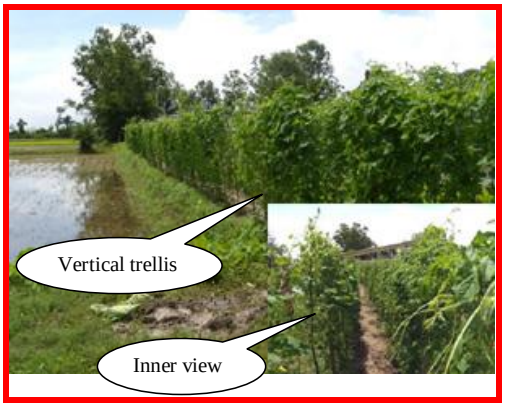

Fig. 6: Bitter gourd cultivation on *Ail* during rainy season on vertical trellis

Neem cake @ 25 g per pit is used as a part of organic manure. Then the water soaked seeds or germinated seeds are sown in the pit @ 2 to 3 seeds/pit depending upon the crop varieties. After sowing, the pits are covered with straw or other biomass to keep the underneath soil cool and moist. Generally, in the rainy season, no irrigation is required for crop growth, development and production. Little life saving irrigation, in few cases, is given at the time of initial phases of crop stand. During winter season, bucket or can irrigation is provided using the rain water so harvested in the trench aside the *Ail*. Even, non saline pond water from the pond so excavated within the paddy field is also taken using mud pitcher or metallic bucket to irrigate the crop particularly in the critical stages of crop growth. The trellis are required to provide support the crops like french bean and bitter gourd and these vertical trellis are made upto the height of 150 cm to 200 cm. Two rows of vertical trellis along the crop rows are installed. To strengthen the structure, bamboo is used as vertical pole and G.I. wire are tied with the poles at two to three parallel horizontal levels. Jute string is also used for providing the support to the plant to climb upwards.

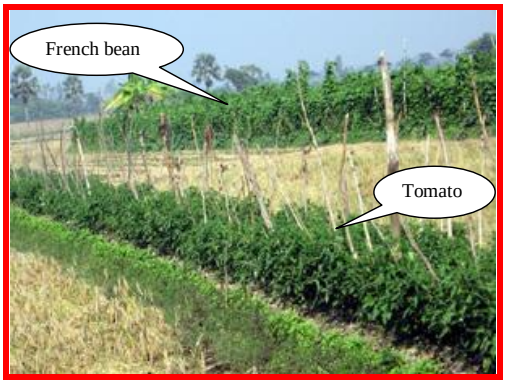

Fig. 7: Tomato and French bean cultivation on *Ail* during winter season

Economic Impact of the Technology:

It has been observed that from one hectare of land, at least 400 meter long *Ail* is obtained having the width of 90 cm at the top. The main field is engaged with paddy during rainy season and the *Ail* land is utilized for cultivation of vegetables which fetches good market price and creates two economic situation of a small fragmented holding viz. i) mega-economics of the monsoon paddy which is less remunerative and often threatened by the natural calamity and ii) micro economics from the *Ail* which many times become more viable than mega economy. In the traditional system, 120 m^2 of land is utilized for construction of *Ail* whereas in the modified system of *Ail* cultivation, additional 280 m^2 of land is utilized on the main field.

Spread of the Technology:

The technology of *Ail* and *Aerial* cultivation was first conceptualized by KVK in the year 1997-98 after the innovation of land shaping technology in the year 1981-82. The on station trial on *Ail* and *Aerial* cultivation was set up in the KVK Instructional Farm and observing its remarkable additional income generating potential, these technologies were demonstrated in two villages under Jaynagar-II block in the year 2000-01. Within the span of 5-years, most of the farmers of South 24-Parganas district realized the benefit of this technology and adopted it by their own, knowing the technicalities from the KVK and even from the KVK adopted Farm Science Clubs. In the year of adoption (2001-02), the total length of *Ail* under vegetable cultivation was around 5 km which presently extrapolated to most of the blocks of South 24 Parganas district having a length of more than 500 km. Seeing the rapid change of economy, presently no farmer waits for any institutional funding for construction of land embankment in their own field. It is needless to say that *Ail* and *Aerial* cultivation technologies have not only spread in south 24-Parganas district but also it percolated in the neighboring district like North 24-Parganas having more or less same type of agro-ecological condition and the State Agriculture Department has included this technology as a component of Natural Resource Management of NWDPRA (National Watershed Development Programme for Rainfed Area) programme implemented in these districts.

The *Ail* and *Aerial* cultivation technologies developed by KVK, South 24-Parganas have created an immense impact for augmenting the vegetable production throughout the year particularly in the lean period. This sustainable technology has not only increased the productivity of vegetables but also improved the standard of living of small and marginal farmers by increasing their income per unit area. A very rapid horizontal percolation of this technology has been observed than any other contemporary technology in South 24-Parganas district as well as neighboring districts. Considering the positive impact of this technology the State Agriculture department and Sundarban Development Board, Govt. of West Bengal is replicating this technology in other areas with similar agro-climatic situation.

Bee keeping made a tribal farmer entrepreneur

Till a few years back, bee keeping was never a livelihood option for the tribal of Jharkhand. Though they used to consume honey at the household level, natural honeycombs were the only source of honey for them. Further, they had little knowledge about the environmental and economic benefits of bee keeping as well as knowledge and skill of bee keeping. So, despite the abundance of rich flora in the state, bee keeping as a source of income stood wasted until recently.

The importance of bee keeping in Ranchi district of Jharkhand took a turn, when during 90's the KVK Ranchi started offering training on bee keeping. Alongside training, needed support was also provided to the sincere participants. The package of one month training included all the aspects of hygiene management to make the honey saleable in the market.

Sri Jaleshwar Mahato, a tribal youth of village Kharkhutoli under Burmu block, Ranchi district was one of the aspiring youths to attend the training programme at KVK Ranchi. Disillusioned in agriculture, Sri Mahato was seeking an alternate livelihood option to help his family. He alongwith his family members tried for almost twenty years to turn their fortune through agriculture but could not even ensure the bare necessities. Leaving aside agriculture, he decided to shift to bee keeping for better earning.

Tribal farmer with bee-hives

During the initial days of the training, he could not find any prospect in bee keeping. However, visiting and interacting with a few successful beekeepers in and around Ranchi, he could understand the prospect of this venture. He paid full attention to training and successfully completed the course. The KVK, in turn, provided two Italian bee boxes to start with. The acquired knowledge and skill followed by supervision by KVK provided the needed confidence to Shri Mahato to continue the new vocation. Within next two years, he multiplied the bee colony from 2 to 25 and extracted nearly 240 kg honey. The harvest fetched him more than Rs. 25,000, a profit beyond his imagination. As per advice of the KVK, he sold 10 bee colonies to other beekeepers for an additional income of Rs. 1000. He went on increasing the number of bee colonies every year with simultaneous sale of old colonies to maintain a steady income from bee keeping. In the next two years, the production of honey was 655 kg which fetched him more than Rs. 50,000/-.

The income from bee keeping has not only turned him into a successful bee keeper but also improved the economic condition of his family. The success has inspired him to go for improved agriculture also with cultivation of vegetables in large area using bio-fertilizer and organic manures. Again, the KVK provided the required skill and knowledge in vegetable cultivation. He is using hybrid seeds for vegetable cultivation. He has also dug two sizeable wells for irrigation purpose. The KVK is utilizing his expertise as 'master trainer' both in bee-keeping and vegetable cultivation. Bee keeping as a sustainable source of livelihood has become a reality among many tribal youths of Ranchi district following the success of Shri Mahato and guidance of KVK and the number is increasing every day.

Breaking the poverty cycle with technology support

Rajnath Singh, a poor farmer of village Gamhariya of Adhaura block maintains his five-member family through farming. Though he owns nearby 10.0 ha of land but major part of his holding is upland restricting him to cultivate only such crops that require minimum irrigation. Even in a good year, he was able to harvest barely though rice to feed the family and niger during rabi with yield ranging from 2.5 to 3.0 q/ha. If the rains failed, then the crops did too, leaving his family nearly destitute. During such dire situation, he used to scrounge for work wherever he could find it-on roadsides, construction sites or as a hired labour. The family never know where the next meal would come from; there was little to eat and no security of income. Life was passing on without any future plan either for himself or for his children.

Desperate to earn income from farming, he tried a number of avenues like rearing of poultry and cattle but substantial income always eluded him. As a last option he came in contact with Krishi Vigyan Kendra, Kaimur during 2006-07 with his plight and desire to change his near ruined destiny. Surprisingly he met many such farmers in KVK with almost identical situation, some of them were even known to Rajnath Singh. The appeal of the farmers was readily accepted by the KVK and within a week, the staff of KVK visited the field of the farmers including that of Rajnaths's. The observation revealed that traditional method of cultivation alongwith poor quality seed were the major causes behind low productivity of crops. The reason was vividly described by the KVK staff with probable solution in the farm of shifting towards better agricultural practices. After getting nod from the farmers, the KVK decided to go for front line demonstration programme on niger in the field of Rajnath Singh for an area of 0.75 ha. He was provided full package of practices including improved quality seed. Before actual commencement of frontline programme, Shri Singh was imparted training on improved crop cultivation in niger at KVK and he was categorically advised to follow the instruction of KVK staff in each and every step of crop cultivation. Rajnath, for the first time in his life, harvested 7.8 q/ha niger yield and it was like a dream to him. He earned Rs.12,650/- from demonstration plot, highest he had ever fetched, with the technical and material support of KVK. The success inspired him so much that during next year he cultivated niger (var. JNC-6 and BNS-1) in his entire farm of 10 ha with the newly learned technologies and he was richer by Rs.1,13,000 within two years. Shir Singh was so obsessed with the performance that he became the spokesperson for the KVK and motivated 65 more farmers from 7 adjacent villages to go for niger cultivation with the technical support of KVK, Kaimur. From a modest beginning with 0.75 ha, in Bhabua block only 85 ha area is under higher cultivation with average yield of 7 to 7.5 q/ha. A Niger Growers' Group has also been formed under the leadership of Shri Rajnath Singh to bargain and finalize the price of niger for a better remuneration of the farmers.

Breaking of poverty cycle by Rajnath Singh could be best interpretated through his own words, “Five years back I was a hired labourer while today I am hiring others to work on my field. We are planning to build a house, something we could not even have dreamt about before”. Service to the farmers by KVK, Kaimur has usher into a new beginning.

A view of niger field of Rajnath Singh

Convergence between KVK and MNREGS brought prosperity

'Ranibandh' a heavily silted water harvesting structure, stood on the way of agricultural development in Jamboni block of West Midnapore district, West Bengal. One of the adopted villages by KVK, West Midnapore, Asthapara was the worst affected as in spite of intervention by the KVK with a number of agricultural and allied technologies, neither the cropping intensity nor the socio-economic status of the village farmers could be improved. And the main reason behind it was acute scarcity of water. Even the livestock rearing practices became unpopular due to high mortality rate during prolonged hot summer season. The villagers and the KVK realized that excavation of the silted structure was the only option to bring agricultural prosperity in and surrounding areas but the resource poor farmers could not afford to take up this de-station work.

Field visit of members of ATMA

Implementation of MNREGS in West Midnapore during 2008 brought some rays of hope in solving this problem. The KVK in consultation with Farm Science Club, Asthapara (formed by KVK long back in 1988) and village leaders (i.e. village Panchayat), prepared a participatory re-excavation plan for 'Ranibandh' with necessary provision of grass furfing, fruit plantation, irrigation channel, dyke protection measures to reduce siltation etc. The District Magistrate of West Midnapore was invited to visit the village and finally the visit took place in the month of January 2008. The participatory mode of operation envisaged by the KVK was discussed in detail followed by participatory model on resource utilization by the villagers. The day-long interaction, assessment and visit to the catchment area finally convinced the District Magistrate to sanction the project with fund involvement of Rs.9.43 lakh under MNREGS as an experimental case for a total

catchment area of 80 acres. The KVK took the responsibility for technological interventions as frontline demonstration programme as well as monitoring, follow-up and other associated activities to ensure accountability, transparency and people participation in every step of project implementation.

Need based interventions like land developed for SC/ST people, drought mitigating measures, nutritional food security measures an envisaged by KVK in its development plan were executed during next two consecutive years. National Horticulture Mission was approached for promotion and production of mango in the catchment area. Social dimension like health camp at work site for the labourfolks was also included in the project. With the active participation of the villagers and extending helping hand by other organizations, the farmers are cultivating mustard, groundnut and vegetables as alternate crops in rabi besides kharif crops to increase the cropping intensity to 186 percent from a meager 116 percent. Irrigation has been assured for 110 acres of land during rabi and lean season through re-excavation measure. Out of sanctioned 80 acres of catchment area, 40 acres of land has already been converted into mango orchard and another 10 acres of wasteland beyond the purview of catchment area has also been brought under mango orchard with the courtesy of NHM. Location and size of plat for cultivation of crops are being determined by water-crop demand relationship. Recycling of irrigation water and dyke protection measures with suitable wires and grass turfing in order to reduce siltation are given adequate emphasis.

KVK as facilitator has brought a visible change in the entire project area with its technological interventions as well as involving the farmers in other prog4ammes like RKVY, ATMA, NFSM, NHM, DRDC etc. Participation in agriculture and non-agricultural activities has enhanced the farmers average annual income to the extent of 30 percent. Land less labourers are also getting regular job in addition to rearing backyard poultry, piggery and duckery with skill and knowledge imparted by KVK. The village Asthapara has been turned into a model village with adoption of under agricultural and allied practices. Dovetailing the benefit of various schemes for the development of farming community has added an extra feather in the crown of the KVK.

Crop intensification with ground nut gained success

Red and lateritic zone of West Bengal is characterized by sub-tropical climate with average annual precipitation of 1000-1200 mm (80% of rainfall received during June-September) and range of temperature from 16-42 ^{0}C. Land being undulated in nature, tends to erosion of top soil leading to poor status of N, P, K and organic matter. Soil texture is sandy to sandy loam, rich in iron and alluminium but deficient in Ca, Mg, B and Mo. Water retention capacity of soil is poor and pH varies from 5-5.5. The area is dominated by cultivation of *boro* rice in rabi-summer and *aman* rice in kharif season. Area under *boro* rice cultivation is decreasing day by day as ground water level is going down every year due to erratic, uneven and scanty rainfall. Still the copping pattern of the zone is paddy-paddy-fallow.

Supervision of ground nut field by KVK staff

Farmer with bunch of ground nut

A large tract of West Midnapore district comes under such red and lateritic zone where the cropping system is gradually turning into paddy-fallow-fallow. The farmers badly needed a viable option to substantiate the loss due to decrease in area under *boro* rice cultivation. Sporadically a few farmers tried for other crops and vegetables, but the success of sustainable crop cultivation to replenish *boro* rice eluded them. A group of farmers from four villages namely Jamrasuli, Dhuliapur, Asthapara and Tura of West Midnapore approached KVK during 2005-06 to help them find an alternate crop for this area which would provide assured return in terms of productivity and marketability. Realizing the magnitude of the problem, the KVK opted for agro-ecosystem analysis through PRA in the villages to characterize the present agricultural situation and identify the opportunity to introduce a new crop as per the need of the practicing farmers. Visit, interaction and detailed survey helped the KVK to identify such a crop that would suit the existing climate. Finally, the KVK decided to introduce 'groundnut' in the selected villages as an alternate crop for that area. Detailed meteorological information like humidity, sunlight,

cloudy days etc. were also collected from concerned department before actually implementing the programme of groundnut cultivation.

Farmers in action in the field

In the initial years, the KVK assessed the performance of four varieties of groundnut namely, TPG-41, TG-26, TG-38 B and TAG-24 in a number of locations of those villages to find out the best suited variety for this identified agro-climatic condition. Varietal evaluation followed the finding of measures against seed borne diseases and pest control. Extension functionaries of line departments were involved in the standardization of cultivation process. Finally the KVK came up with the recommendation of cultivation of TAG-24 variety with seed treatment with *Rhizobium* @ 750/ha, soil application of gypsum @ 500 kg/ha during top dressing after 30 days of seed sowing and boric acid @2.0 g/l of water after 15 and 30 days of seed sowing followed by foliar application of neem-based liquid 50,000 ppm @0.75 ml/l of water and then application of Endosulfan @ 2ml/l of water at spot spraying to control aphid. The assessment was translated into action by KVK through conducting front line demonstrations in 10 hectares area during rabi-summer season with TAG-24 variety. The farmers harvested 20 q/ha average yield with net return of Rs.25, 000/- per hectare. The success prompted the KVK to conduct FLD during next kharif season also where 12 q/ha and Rs.16, 000/- per ha net return were realized. Gradually horizontal spread of the technology started taking place and within next three years and 150 ha of land could be brought under groundnut cultivation.

Requirement of 50-60 acre-inch water through 16-20 irrigation for *Boro* rice cultivation was a severe problem for the farmers to arrange for irrigation water. Cultivation of groundnut was possible only with 10-12 acre-inch water (4-5 irrigations) which was affordable for the farmers. Moreover, cultivation of groundnut has the positive impact on soil health, creates more man-days and ultimately less migration of labour from rural to urban areas. The analysis of soil indicates that pH has been changed to 5.6 from 4.8 followed by increase in availability of Nitrogen in soil to 210kg/ha from 180kg/ha and available organic matter from 0.5% to 0.75%. During the period additional mandays created to the tune

of 10500 numbers which has resulted into 30% less in migration of labour. Groundnut has a good market in West Midnapore as well as neighboring districts also which enables the farmers to get instant return and encouragement for groundnut cultivation. Cultivation of ground nut has not remained confined to West Midnapore district only, farmers of identical agro-climatic situation of districts like Purulia and Bankura also have started adopting the package of practice. The present cropping pattern of red and lateritic zone has been changed into paddy-groundnut-fallow and for the uncultivated upland, groundnut –fallow-fallow. Constant efforts put by the KVK to bring back smile in the face of the farmers have finally paid off.

Cultivation of elephant foot yam proved profitable

Cultivation of Elephant Foot Yam in Birbhum district of West Bengal was a common practice during 80's when State Development Departments initiated it as cash crop mainly among small and marginal farmers. But the farmers stopped its cultivation after 2-3 years as they failed to get remunerative price out of it. Since then the farmers were looking for such a crop which could fetch them substantial amount of money to uplift their socio-economic condition.

KVK, Birbhum in a bid to transfer some of the technologies in agriculture and allied sector approached a cluster of four villages namely Kankutia, Kastikdanga, Senkapur and Deuli under Bolpur-Sriniketan Block of the district. Detailed discussion with farmers revealed the history of foot yam cultivation in the villages and reasons for rejecting this crop by the farmers like the introduced variety was of local selection, low yielding, more raphid content, long duration, less market demand and detrimental to soil health.

Cultivation of Elephant foot yam

Survey conducted by the KVK revealed plenty availability of fallow and backyard land where elephant foot yam could be reintroduced. The KVK in consultation with farmers decided to conduct on station trial of Kavoor variety of foot yam to create a favourable attitude of the farmers towards its adoption. The farmers were frequently invited to observe the performance of the variety by their own eyes as well as to interact with the scientists regarding cultivation practices. This self-observation method motivated the farmers of our villages to cultivate Kavoor variety in their land. Once they were motivated, the KVK organized training programme on package of practices for foot yam both in KVK campus and villages.

The KVK also arranged seed from State Research Farm and Bidhan Chandra Krishi Viswavidyalaya for the farmers to help them get quality seed.

Fifteen farmers from four villages finally agreed to cultivate foot yam in their fallow and backyard land. They planted the crop during Kharif 2002 after making proper pits, maintaining recommended spacing, organic and inorganic manures and other practices. The KVK supervised each and every operation to infuse confidence among them. Finally the farmers could harvest yield of 74250 kg/ha against 2200 kg/ha of local variety. Moreover, after collecting the total production the farmers themselves shared the responsibility by forming groups to take the produce in the market located 10 Km. away. The group sold the produce and profit was divided among the farmers as per area of cultivation. A certain quantity of seed was stored for further multiplication by the farmers. As per the economics worked out by them they could earn a net profit of nearly one lakh rupees from one hectare of land following all the recommended practices. This success not only influenced the neighbouring farmers, the farmers of adjacent districts like Burdwan and Bankura took interest to learn the cultivation practices from this KVK. Farmer to farmer extension of this cultivation practice played major role in popularizing elephant foot yam cultivation in the entire region and KVK facilitated the process. Elephant foot yam as a cash crop became quite popular within a span of five years with the involvement of small and marginal farmers of the region.

Direct seeded rice – a boon for the farmers

Agriculture in Jamui district of Bihar is subsistence in nature. It is partly due to dependence on monsoon and characteristics of soil with low base content, low iron exchange capacity (5 to 15 meg./100g), acidic in reaction and low phosphate (2 to 5 ppm) content. Farming alongwith livestock rearing though is the main source of livelihood, the district is deficit in food grain as well as other edible products. A sizeable portion of the population also depends on jungle, abundantly grown in the districts and womenfolk make leaf plates to support their family. Kharif rice is the principal crop grown in the district followed by wheat in rabi season. But productivity of rice (mainly transplanted) is so low that even in the normal monsoon year, production is just sufficient to feed the population of 10.50 lakh of the district.

In Jamui, the average annual precipitation is 1100 mm but due to its erratic nature, farmers are not able to utilize most of it. During last five years, the pattern of monsoon has drastically changed with late and recede rainfall affecting the paddy cultivation as well as delaying wheat cultivation resulting into low productivity and production of food grains.

Zero tillage machine

Direct seeded rice field

Moreover, in the last two consecutive years, the farmers had to keep almost 75-80% of cultivable land fallow owing to meager rainfall and subsequent declaration as drought hit district by Bihar State Govt. Sensing the alarming situation of vagaries of rainfall, Krishi Vigyan Kendra, Jamui was searching for such an alternative which could avoid the present-day condition to some extent and cultivation of paddy be carried out at an affordable cost by the resource poor farmers. Also the rabi crop (wheat) could be taken up in time to harvest up to its potential.

CIMMYT-India, New Delhi while taking up conservation agriculture programme in the selected states of India, included KVK Jamui in its efforts to demonstrate various resource conservation technologies to enhance productivity of

crops at a lower cost. The KVK grabbed the opportunity to demonstrate direct seeded rice and zero tillage technology for promotion of Resource Conservation means and conservation Agriculture in the district. Resource conservation technologies (RCTs) are the means to enhance productivity of crops and profitability of farmers through efficient utilization of production resources and inputs, to increase yield per unit of scare resources and inputs. RCTs form key components of Conservation Agriculture (CA) – an approach to conserve, improve and make more judicious utilization of natural resources through integrated management of soil, water, crop and other biological resources together with carefully selected external inputs. Conservation Agriculture, in long run, contributes to both enhanced productivity and environmental conservation on a sustained basis. Elements of CA includes minimum soil tillage (minimum tillage, direct drill seeding), retention of soil cover (crop residue) and appropriate as well as economic crop rotations to sustain high yield and to prevent disease and pest problems.

Modest beginning was made by the KVK in 2005-06 with demonstration on direct seed rice (DSR) in 2.0 ha farm area during kharif and zero till drill in rabi for wheat. Simultaneous training programme was conducted for the farmers to make them acquainted with the introduced technology. Success achieved in other states was highlighted through a number of means to arouse interest among the farmers. 'Not to give up' principle of the KVK staff finally started paying dividend and during 2006-07, 27 farmers from Jamui and Khaira block decided to give the new technologies a try in 8.0 ha areas. Besides enhancement of paddy yield of nearly 13 percent, the cost of cultivation was reduced to Rs.5000/- per ha followed by timely sowing of wheat in rabi. However, the farmers could not get the benefit as recorded in the KVK farm. The difference was attributed to associated practices followed by KVK in its farm and the farmers were trained about those practices as well as farmers participatory trials were conducted in the farmers' field with effective method of herbicide application, sesbania-rice co-culture and use of bacterial fertilizer in rice field. The farmers harvested yield of rice in next kharif season more than that of KVK farm. Most importantly, the farmers could save water as nursery raising was stopped followed by no puddling, laddering and transplanting in standing water. Instead, the farmers could provide once additional irrigation in wheat.

Farmer to farmer transfer of technology helped in popularizing the technology at a faster rate and farmers from far-off villages paid visit to the demonstrated fields. The KVK also used various media and help of line department to bring more and more farmers in the ambit of this technology. From 2007 onwards, the demand for ZT machine started increasing and in the same year KVK had to arrange for 42 zero tillage machines in collaboration with CIMMYT-India and ICAR, New Delhi. The State Govt. also announced subsidy against purchase of ZT machine which made it much more popular among the farmers. The coverage of ZT machine and involvement of farmers increased steadily and in 2009-10, an area of 346 ha has been

brought under DSR for the benefit of 209 farmers of the district and the number is fast increasing.

Resource conservation technology as an alternative to traditional rain-dependent agriculture has been proved effective in Jamui district both in terms of enhanced yield in rice and wheat as well as reduced cost of cultivation. As per the farmers, the technology (DSR in particular) came as a boon to them as they could avoid acute labour crisis during peak crop cultivation stage like transplanting and weeding. Alongside, the sowing of wheat in time has been assured which has ultimately enhanced the overall production and productivity of two major crops. Introduction of a farmer-friendly technology by KVK Jamui has helped the district to stride towards food grain sufficiency leaving the dire state of deficiency back.

Drudgery reduction in tea leaf plucking through modified tools

Tea is the second major crop of Chopra block of Uttar Dinajpur District and women folks are especially involved in tea leaf plucking. Above 95 percent of tea leaf plucking is done by women. Tea leavse are plucked by hand. Use of plucking/cutting tool in tea gardens is restricted by the owners keeping in view the health of plants. Hand plucking is a drudgery prone activity which leads to backache, strain on shoulder, fatigue and pressure on heart. Another major problem noticed is finger injuries like contact dermatitis, cornification, lichenification and secondary bacterial invasions which are reportedly caused due to tannin compounds secreted from plant tissues during leaf plucking.

After going through various literatures and internet searching on-farm trials were designed on tea plucking blades for reducing drudgery among farm women. Results of work done in AICRP on Home Science at CSKHPKV, was taken as the reference for its application in the areas under consideration.

Innovative Finger blades

Leaf plucking by finger blades

A simple tool (Dimensions: 4.8 cm x 3.9 cm) made by local ironsmith was taken to the field for testing. But the tool was not welcomed by the garden owners as iron leads to fungal infection in plucked lot and spray of fungicide is must on such plucked tea leave. Taking into due account, effort was made to fabricate it in stainless steel (AISI 304) with the help of CIAE, Bhopal and then the tool was taken back to the farm women in the gardens. This time it was gladly accepted by the garden owner and workers. Thereafter demonstrations were conducted on 50 tea plucking women and work output, grip fatigue and finger injuries were recorded.

Finger wounds before using the tool

During initial stages it was observed that output was decreased as they could not properly grip the tool but gradually the efficiency was increased with time. Besides, the tool has got adjustable finger holders which aided in its quick attuning. Generally the work output is 26.5 Kg leaves per day per women but after getting due acceptance of the tool, the work output is found to increase up to a level of 30 Kg leaves per day per woman.

Feedback received from the women users revealed that the occurrence of finger injuries and grip fatigue reduced considerably. Both the parameters were taken on five point and three point subjective scales, respectively.

Feedback and suggestions were taken at each and every step from farm women and accordingly tool was modified to suit their needs at CIAE Bhopal. The fabricated tool was now given to 75 tea plucking women for different seasons.

High level of enthusiasm was evidenced amongst farm women to adopt the new tool, except a few. Positive response was also received from the garden owners as the use of the modified tool helped in maintaining the good health of plants owing to reduced pressure on roots exerted during snatching of leaves by hand in conventional method. The modification in the tool proved beneficial in reducing drudgery in women tea leaf plucker, enhancing rate of plucking and maintaining the health of tea plants.

Elephant Foot Yam cultivation got boost up

The analysis of agricultural scenario in Hazaribag district indicates that the farming systems is relatively complex with high degree of diversity in environment and high risk of production stability. There is predominance of house hold inputs; prevalence of traditional practices; multiple enterprises primarily for domestic needs; dependence on family labour and further sharing; strong interaction between land and house hold economy and production system highly susceptible to stress and perturbations. In short, complex, diverse and risk prone (CDR) production system dominate the farming systems of Hazaribag.

In Hazaribag, elephant foot yam is grown on about 750 ha and produces nearly 34 thousand tones. Presently the productivity of elephant foot yam is about 45 tones / ha though there is tremendous scope of increasing the productivity up to 60 tones / ha in the coming years. Again, a vast area of arable wasteland in the district may be brought under cultivation of this crop by motivating the small and marginal farmers.

In last one decade (1999-2008) there has been sharp increase in the area under elephant foot yam in the district of Hazaribag as the area in 1999 was meager 250 ha, which increased up to 758 ha in the year 2008, recording almost three fold increase in area. Similarly, the production also increased by 228.9 per cent as the production in the year 2008 was 34110 tones. A decade back in the year 1999 total production of elephant foot yam was 10370 tones. The area, production and productivity of elephant foot yam in last one decade (1999-2009) are presented in the Table.

Table: Area, Production & Productivity of elephant foot yam during 1999-2008

Year	Area (ha)	Production (tones)	Productivity (t/ha)
1999	250	10370	41.5
2000	280	11760	42.0
2001	315	13540	42.9
2002	307	13500	43.9
2003	320	13920	43.5
2004	495	20290	40.9
2005	580	26100	45.0
2006	650	28600	44.0
2007	720	31320	43.5
2008	758	34110	45.0
2009			

A gradual increase in area and production except in the year 2002 was observed. The productivity of the crop in last decade ranged between 41.5-45.0 t/ha.

A critical observation of the existing elephant foot yam cultivation and its potentiality to expand in wasteland as well as homestead fallow area inspired the KVK Hazaribag to take up rapid expansion of proper method of elephant foot yam cultivation practices in the entire district. The KVK collected production data of all 14 blocks of the district and prepared plan of action accordingly as a first step towards technology expansion process. To make the farmers aware of the proper cultivation practices of elephant foot yam, the KVK identified the farmers including farmwomen from all 14 blocks to impart training at KVK farm and in the farmers' field. Every year 3-5 training courses were conducted by the KVK prior to the planting and during growing period of the crop. The areas covered through training were pit formation, proper seed corn size, seed corn treatment, planting distance, planting time, intercultural operations, plant protection measures, harvesting and storage technique. Altogether 43 training courses were organized by the KVK during 1999-2008 for 973 farmers and farmwomen on cultivation of elephant foot yam started increasing and in 2008, an area of 758 ha was brought under this crop from 250 ha in 1999. The productivity was also sharply increased from 41.5 t/ha to 45.0 t/ha.

Elephant foot yam has been accepted by the farmers of Hazaribag as the choicest tropical tuber crop. This crop is grown as rainfed kharif crop in homestead as well as in uplands. The common cropping pattern followed by the farmers is elephant foot yam-potato-vegetables. In all the blocks of Hazaribag, elephant foot yam has fit into the existing cropping pattern either with rai, carrot, potato, onion or vegetables. The cultivation of this crop has also been expanded to newly established mango orchards. In certain parts of the district, elephant foot yam-maize intercropping (alternate double rows of elephant foot yam and single row of maize) and elephant foot yam-red gram intercropping (alternate double rows of elephant foot yam and single row of red gram) are followed by the farmers in upland.

The untiring efforts of KVK Hazaribag have contributed significantly to make elephant foot yam a very popular edible crop in the entire district. The improved variety 'Gajendra' popularized by KVK through demonstration and regular supervision has outplayed the other varieties cultivated earlier due to absence of acridity factor in the introduced variety. The present production level of elephant foot yam has to a great extent met up the market demand. Previously West Bengal and Andhra Pradesh used to supply elephant foot yam to Hazaribag but of late supply from other states has became negligible. Moreover, the KVK has also encouraged farmer-to-farmer extension of this technology through visit, group meeting and other means which helped other farmers also to adopt this cultivation practice.

The initiative taken up by KVK Hazaribag 10 years back has finally proved beneficial for the improvement of the economic condition of the farmers of Hazaribag.

A view of elephant foot yam field

Fish cultivation turned into a profitable enterprise

The journey of Mr. Manas Bhattacharjee of Jaynagar block of S-24 Pargans district was not at all rosy to reach to his destination – a successful entrepreneur. 'I can never forget those days', murmurs Mr. Bhattacharjee, a 45 years old successful man in his endeavour. Mr. Bhattacharjee had to abandon his studies in the midway to assist his father in earning the livelihood of their five-member family. He was then a young lad of 16 years with the merit to excel in life. But the destiny handed him over the job of a helper in a poultry feed store to him for a meager pay of Rs.260 per month. Mr. Bhattacharjee had an inherent quality to fight till the end which helped him in a big way to prosper in life. The honestly and good manner made him popular within a short period among the customers and some of them even became closer enough to know about his appalling economic condition. A person from highest caste working as a helper was also felt genuinely by some of the customers. It was in the year 1993 when Mr. Bhattacharjee came across a person whom he considered as 'Good' to rescue him from the job of feed seller. He got the contract to capture fish worth Rs.14000 from a sizeable pond from where he earned Rs. 38,000/- .

Pond for fish cultivation

However, his aged parents did not agree with the job as fish capturing was confined among a particular caste only and in their entire village no other person from other caste was involved in that profession. After lot of persuasion finally he was allowed to accept the offer with the condition that he would not be directly involved in capturing fish. In the year 1995 the 'God' gifted him a small pond in his locality – this was the beginning of shining of his fortune. The experience gained for last two years came handy for Mr. Bhattacharjee to concentrate in the new enterprise with utmost sincerity and hard work. However, production of table fish did not provide the desired output to Mr. Bhattacharjee. At this juncture, he came in contact

with KVK South 24 Pgs (Nimpith) for assistance and guidance. The KVK advised him to go for prawn cultivation as prawn had very good market. After visiting the KVK pond a few times, he became confident to start prawn rearing. He acquired the necessary knowledge and skill from KVK followed by information about availability of quality spawn. In the first year he followed the instruction of KVK word by word starting from pond management to feed application to nurturing to harvesting of prawn. The KVK in turn, regularly supervised his pond and provided the guidance in every stage of prawn production. The production was beyond the imagination of Mr. Bhattacharjee and for the first time in his life, he made net profit of Rs. 65,000. Again with the guidance of KVK he gradually expanded his business by acquiring some more water bodies for production of varieties of fishes. Presently he owns 14 ponds covering an area of 20 acres (8 ha) and he is the first person to introduce the production of Red Tilapia, a highly preferred ornamental fish. The KVK has also arranged training on fish packaging for selling fish and prawn to Kolkata market, the biggest fish market of India with much higher profit. Mr. Bhattacharjee has not only improved his economic condition, he has provided employment to 12 unemployed youths for pond management, fish capture supervision, packaging of prawn, transportation to Kolkata market and as marketing manger. He has trained his hired employees through KVK and other institutes to make them skillful in their job. The fish vendors of South 24 Parganas and even from North 24 Parganas are the regular customer of Mr. Bhattacharjee. He has leased out a sizeable part of his water bodies for Rs. 2.4 lakh per annum, still his fish farming enterprise is flourishing day by day.

Mr. Bhattacharjee has truly become an entrepreneur not only for the prosperity of his family but also for the benefit of the entire locality. Starting his journey as a helper in poultry feed farm, within 15 years he has idolized himself of beaming success to inspire others to opt for self-employment. And others are following his foot-print.

Improved system of farming for ensured household economic security

Mr. Ghanashyam Dangi, a farmer of Dariatu village of Chatra block, Jharkhand is no longer a resource poor farmer. Thanks to his wise decision and support of KVK Chatra.

Complex, diversified, rainfed and risk prone agriculture is the common feature of Chatra district which forces the common farmers to somehow cultivate rice as monocrop with one or two seasonal vegetables where a little amount of irrigation water is available. Mr. Dangi, a 45 years old farmer was also of no exception who used to thrive hard for the livelihood of his eight member family through cultivation of rainfed rice and niger in his 3.5 acres of land. He even did not hesitate to work as labourer alongwith selling labour of other family members as well. In the year of normal harvest of rice and niger, the produce used to be just sufficient to feed his family but in odd years, the entire family used to starve. The hope of 'better future' however, infused the power in him to struggle against destiny.

During implementation of an agricultural project by District Rural Development Agency (DRDA) in Chatra block of Jharkhand, Mr. Dangi was approached to dig a well in his barren land for supply of water. Anticipating the benefit of a well in his land he readily agreed to the proposal and within a short span of time facility of assured water was created. The turn-around started from this decision for Shri Dangi. Once the supply of water was assured, he wanted to go for better cultivation practices. But lack of knowledge, skill and other services prevented him from doing so. The KVK Chatra located in the vicinity came in his rescue to provide proper guidance for better agriculture. His determination and aspiring attitude was appreciated by the KVK. After visiting his field twice, KVK advised him to go for such system of agriculture that could incorporate a number of components at a time. Shri Dangi liked the idea and requested the KVK to go for this 'unique system' for improvement of his economic condition. The KVK in turn formulated a comprehensive farming system plan to cultivate field crops, off-season vegetables, spices and medicinal plants in 3.5 acre and a poultry unit in the backyard. KVK arranged for adequate training on cultivation and management/rearing practices of various crops and poultry birds to provide required skill. The KVK provided some inputs to go for timely execution of initial activities.

Intense supervision by KVK followed by hard work on the part of Shri Dangi proved quite effective in enhancing the yield of agricultural crops as well as return from newly established backyard poultry. Within next two years his income from off-season vegetables and poultry unit raised to Rs.42, 000. The success inspired him to continue with improved agriculture followed by incorporation of dairy unit of improved breed of cow as an added component. Expansion of poultry was his next

target that he fulfilled in the same year. The annual net profit of Shri Dangi went up to Rs. 90,000 from the components of agriculture, dairy and poultry. The person used to work as labour started hiring labours almost throughout the year. A resource poor farmer turned into a resource rich one through improved system of farming. The success of Shri Dangi has become an eye-opener for the farmers of adjoining villages with a trend of shifting to improved agriculture from the age-old practices. Besides earning a good name for the KVK, he has also been awarded by State Govt. and other organizations for his hard-earned achievements.

A view of improved vegetable cultivation practice

Improvement of *deshi* ducks through cross breeding

Mainikdih, a small remote village of Purulia was no way different from other villages of Purulia. The inhabitants were small and marginal farmers with little educational background. They had to strive hard to sustain their families through rainfed and CDR type of agriculture with very low soil fertility status. Still the village came into limelight through local newspapers for a silent achievement.

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 development 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 during early 90's but did not yield any result. The f KVK learned in detail about this programme and observed that good number of *deshi* ducks was available in that village.

Ducks in Duckery

Further interaction revealed that duck egg and meat had very good preference among the villagers. Moreover, the demand for duck meat touches its peak during a local festival (*Manasa Puja*) as ducks are offered to this 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 provided in 1998 and 1999 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/egg weight. This was followed by longer laying period (130-135 days as against 50-60 days for local ducks) and brooding of better quality ducklings (51 gm weight of day old duckling against 37 gm of *deshi* one) with almost not 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). This performance of upgraded ducks

helped this 12 families earn sizeable additional income both from egg and meat. The price of eggs laid by crossbred duck is much higher due to its size and weight. The economics worked out by KVK indicated that only from egg the farmers earned a profit of Rs.330 per duck. As the drake of Khaki Campbell is available @ Rs. 70/- only with State Poultry Farm, Purulia and the ducklings do not need any extra care except vaccination against Duck plague at 2 months of age, the farmers could earn some extra income without incurring additional expenditure.

This very low cost upgradation technology of *deshi* ducks became popular in 23 villages of Purulia and 145 drakes were supplied. And more and more farmers are showing interest in adopting this technology. This success of KVK, Purulia has been widely covered by local newspapers which have made the small rural village Manikdih known in the entire district.

Intensification of diversified agriculture for sustainable livelihood

Agriculture of Sundarban areas of South 24 Parganas district, West Bengal was predominantly of low cropping intensity due to widespread practice of mono cropping. Monsoon paddy was the principal crop of the district with scattered vegetable cultivation during rabi season. In some years, the farmers even could not harvest rice due to natural calamity (flood and storm) putting their families in abject poverty. Late monsoon and water stagnation in some years prevented the farmers from vegetable cultivation also. Since late 90's KVK, South 24 Parganas (Nimpith) came across many farmers with the frequent problem of crop failure due to vagaries of monsoon. In a bid to overcome this problem as well as intensify the cropping system, KVK South Parganas assessed the cultivation of seasonal vegetables on strips of lands (bunds of ponds and low land) in three mainland (well connected with road) villages. Analyzing the weather parameters of last 10 years, the KVK identified suitable vegetables for cultivation on bunds. As per calculation, 396 sq. metre bund lands can be obtained from one hectare of land. Generally the bund is raised upto 1 metre height and width is also increased to 1 metre using the soil of the same land. This modified land bund is used for vegetable cultivation during kharif season as the vegetables are not damaged due to submergence. Again during rabi season as the soil of bund attains optimum moisture condition earlier than that of main land, the vegetables are grown successfully with life-saving irrigation by utilizing the rain water harvested in the canal made up during bund preparation. It has been observed that cultivation of tomato and french bean in rabi and okra, bitter gourd and cowpea in kharif was most suited for South 24 Parganas micro-farming situation. An average additional income as recorded from 369 sqm bund (ail) is Rs. 5267 during rabi and Rs. 4850 during kharif.

Small land holding though is considered as a bottleneck for improved agriculture, it has served as a boon in South 24 Parganas. Due to smallness of holding, more and more bund (ail) area could be available for seasonal vegetable cultivation. The outcome of this innovative bund (ail) cultivation of seasonal vegetables can be best understood by the speed of its spread and adoption by a large number of farmers of the district irrespective of main land and islands. Within a span of less than 10 years, 62.22 percent farmers have successfully adopted this cultivation practice in the district and as per record of the KVK, the farmers are getting economic benefit of Rs. 10000-11000/- per 396 sq. metre bund area from vegetable produced with a meager investment (Rs. 1000-1200 for quality seeds and fertilizers).

The alternative type of cultivation has created distinctively two economic situations in the district- macro or mega economic and micro-economic situation. Though the macro economic situation is fully controlled by monsoon rice, backbone of the agriculture of the district, many a time it is proven to be less remunerative and often threatened by natural calamity. This alternate type of cultivation based micro-economics, on the other hand, is becoming more and more viable, particularly where irrigation water is available. Adoption of this low cost alternative practice of bund cultivation of vegetables has created a positive impact in the entire district. Sunderban development board and Department of Agriculture have taken up this programme for its further expansion.

Preparation of bund for vegetable cultivation under process

Vegetables on bund

Vegetable on Bund during monsoon

Vegetables on bund during rabi

Lac cultivation – as subsidiary enterprise

This is the story of a 30 year old tribal farmer, Mr. Loknath Singh, son of Mr. Shiri Singh of village Sarodag of Adhaura block under Kaimur district, Bihar, who got Kisan- Shree award with a cash prize of Rs. One Lakh from Bihar State Govt. for the year 2006-07 for his specific success in Lac-cultivation and processing. Mr. Loknath Singh, with his keen interest and burning desire not only gained economic mileage from Lac cultivation but also became a proficient farming specialist in the area. He belongs to a tribal family of the village which is very remote at a distance of 20 Kms. from block headquarter and 75 Km. from the district headquarter, surrounded by dense forest and connected with only a Kacha (temporary) road and situated in Naxal affected area. He is educated upto middle standard (VIII class) and is able to read, write and speak. He owns 5 acres of land which is totally rainfed, out of which 2 acres of land is rocky, difficult to plough but covered with lac host trees viz. Ber, Palas and Kusum. Beside this, surrounding area of forest also has abundant lac host trees namely Kusum (*schleichera oleosa),* Ber *(zizypus mauritiana) and* Palas *(Butea monosperma*).

Immature lac sticks on Ber host tree

Inoculation of Lac insect on host tree

On rest of 3 acres of land, he was growing local varieties of crops of Paddy (lowland-1.5 and upland-1.0 acre) and kharif vegetables (0.5acre) with traditional methods of cultivation obtaining the yield hardly to feed his family of 6 members throughout the year. This condition compelled his family for seasonal migration for 2 months during December-January to plain area of the district.

Mr. Loknath Singh is little bit innovative too in his ideas and well aware of the changes taking place in his surroundings including his own field. He observed that the wild ber trees (Jharberries), Palas and Kusum in ample number were available naturally on the piece of land which was left barren due to its rocky nature. He occasionally visits Vanvasi Seva Kendra (well reputed local NGO) and Vanvasi Krishi Vigyan Kendra for the knowledge and skill related to his observation.

Harvesting of lac from host tree

Lac processing by farmer in lac processing unit

It was October 2004 when Mr. Loknath Singh accompanied by a dozen of other tribal farmers of his village came in contact with KVK Adhaura, Kaimur, to know about scientific lac cultivation. The KVK inspired and motivated them to utilize the locally available lac host trees for generation of income and employment through lac cultivation. The KVK also showed them lac cultivation on Ber, Palas& Kusum trees on KVK-Farm. It was the turning point for him, says Mr. Loknath.

Soon after the visit and interaction, he attended a few short duration training programmes at Vanvasi Krishi Vigyan Kendra and gained the knowledge and skill related to lac cultivation and processing techniques. After attending training programme, he came to know that lac host trees can be utilized for lac cultivation easily and this practice has potential to reduce the poverty of himself as well as of other tribal of his village and adjacent areas also.

After training, he along with his group of 12 fellow farmers were helped for the essential tools like Secateur, Dauli, Tree-Pruner etc and other facilities available with the DST project on promotion of Lac cultivation in January, 2005.

Mr. Loknath and other farmers started pruning schedule on Kusum since January, 2005 and on Ber since February, 2005. He inoculated about 80 Kg Kusumi brood lac on August 2005 which was made available through DST project and followed schedule of spraying, harvesting etc. in time and got the yield of 5 quintals of scrapped lac and sold to factory at Ranchi @ Rs. 150/- per Kg. The income within year impressed other tribal families also who later started the lac-cultivation.

Initially, he was reluctant to continue lac-cultivation throughout the year due to non-availability of brood lac from summer crop, but in June 2006, he observed brood lac on Kusum trees in good condition which eliminated the fear. Mr. Loknath and his other fellows maintained lac-cultivation from the locally harvest brood lac from summer crop in 2006.

Now Mr. Laknath Singh is earning Rs. 50,000 per year as additional income from lac cultivation and playing the role of master-trainer for other farmers of his area. Besides, he and other 30 farmers are now cultivating the crops and vegetables with improved varieties and production technologies on rain-fed land with productivity almost double then that of 4 years earlier. This successful adoption of improved technology by 30 families directly reduced their seasonal migration and changed their mind-set towards use of natural resources viz; land, water, forest and available bio-diversity.

Moreover, Mr. Loknath started relying on the scientific technologies of crop production and protection available with the Vanvasi KVK and proved himself as a role model for hundreds of farmers of his area. Realizing his specific efforts and innovativeness, District administration selected him as the best farmer of Adhaura block for Kisan Shree Award with citation and cash prize of Rs. one lakh for the year 2006-07.

Mr. Loknath, thus has proved that 'God helps those who help themselves'. Finally the dream came true what he had seen 3 years before. It is beginning of the story, "I am really very happy as Lac-production has given me social status in the area and district" said Mr. Loknath.

Marigold cultivation - a profitable enterprise

Cultivation of marigold in Bhojpur district was confined among a few large farmers who used to decide the market price of this flower. Though marigold is used throughout the year for a number of social occasion as well as aesthetic purposes, cultivation of this flower could not be percolated among the common farmers. While implementing National Horticulture Mission at the behest of Rajendra Agricultural University, Pusa, Bihar, KVK Bhojpur came across a number of farmers who either discontinued the practice of marigold cultivation or could not start the practices for a number of reasons. KVK met the farmers for a number of times, discussed the prospect of marigold cultivation and finally convinced a good number of farmers to start the cultivation process.

The venture initiated by the KVK with a series of training programme on marigold cultivation alongwith analysis of resource availability with the participants. Finally, 125 farmers were selected from 15 villages who had assured irrigation facility/capacity to arrange irrigation, sizeable land holding with soil type of sandy loam, loam and sandy soil in medium and low land situation. Out of the selected farmers, 50 farmers had some experience of flower cultivation and the rest was new.

Merigold growers in their fields

The problem of raising quality planting materials was taken care of by KVK and the farmers were provided with 9, 66,500 number of marigold seedlings to bring 12 ha of land under marigold cultivation.

During the initial year, the KVK supervised almost every stage of flower cultivation starting from transplanting to plucking and basket packing by regular visit to the field and providing on the field solution. The supervision was also carried out through telephone and mobile SMS. The farmers under the guidance of KVK

harvested 100 q/ha average yield to get a profit of nearly Rs. 70,000 per ha. From next year onwards, the number of farmers as well as coverage of area started increasing significantly and within next five years, more than 80 ha of land was brought under marigold cultivation.

The economics worked out for five consecutive years showed that for average cost of cultivation, transportation and wastage of 10%, the farmers had to incur Rs. 22000-25000/ha for earning the profit of Rs. 80,000/ha. To facilitate the small farmers having 0.1 acre land for marigold cultivation, farmers cooperative was formed for marketing of flowers in main market in and around Patna, state capital of Bihar. To avoid market glut as well as drop in demand, the farmers were persuaded to go for distillation plant for extracting oil from left over marigold flower for its sale as value added product. The help provided by the KVK enabled the farmers to install distillation plant with financial support from banks to enhance their income. The farmers are now selling flowers and flower extract in other states also. Marigold cultivation has become a sustainable enterprise for the farmers of Bhojpur.

Mushroom cultivation opened a new vista for tribal women

Dumaria, a tribal dominated remote village of Jharkhand was traditionally agriculture dependent. But rain fed agriculture could hardly provide the required food grain to 67 tribal families in any time of the year. Migration in search for other work was the regular feature of the village. The tribal women badly needed a little bit income to run their houses with fairly large number of family members. During such stress period Ms. Vimla Gagrai, an educated young woman of that village came to know about a training programme being offered by KVK, West Singhbhum on Mushroom Production Technology through a local newspaper. This tribal lady was engaged in different social programmes for the upliftment of the women. She motivated twenty five tribal young women for mushroom training and approached the KVK for conducting an off-campus mushroom training programme. The scientists of KVK, West Singhbhum after visiting her village a number of times and interacting with all these women finally decided to organize a demonstration-cum-training programme in Dumaria village for three days.

Mushroom beds

A small demonstration unit was set up by the KVK. The women were trained by doing herselves during this programme and spawn was supplied by the KVK. The scientists supervised the demonstration unit on a regular basis alongwith all the women. The first-flush of mushroom was quite encouraging and they could harvest 7 kg in first plucking. Altogether this unit produced 24 kg of mushroom in four plucking. Half of the produce was consumed by them and the rest was sold to market @ Rs.40 per kg.

Sprouted mushroom

They purchased 32 bottles of spawn from that money and began to produce of their own. The scientists paid visit to this village quite frequently to solve their problems in mushroom production. Presently all the trained women are producing 20 kg mushroom per day and selling at a good price in the local as well as nearby main market. Mr. Vimala is managing the spawn and disposal of the produce to assure that the tribal women get fair price out of this enterprise. This mushroom cultivation endeavour has become so popular that the tribal women from far-flung villages are visiting this village and undergoing training. This has made Dumaria village known as 'Mushroom village' in the entire district.

Mushroom promoted tribal women economically

Production of mushroom got a modest beginning way back in 1985 at KVK, Hazaribag with 10 bags of oyster mushroom spawn provided by NBRI, Lucknow. After overcoming the initial hurdles, the Kendra started cultivating oyster mushroom quite successfully in the campus mainly for domestic consumption. Within a span of two years the demand for mushroom became so high that the KVK was unable to fulfill the requirement. Sensing the success of mushroom cultivation in the entire district, the District Administration came forward and sanctioned nearly Rupees one lakh for establishment of a small spawn production laboratory in the KVK for supplying mushroom spawn to the interested mushroom growers. This facility helped the KVK to produce 300 bottles of spawn per month. Meanwhile, a project of KVK on spawn and mushroom production got sanctioned from DDC, Hazaribag which enabled the KVK to spend Rs. 8.23 lakh on production and transfer of mushroom technology in all the blocks of the district.

Mushroom beds

Initially the KVK selected four villages for popularizing mushroom production technology. Constant persuasion, frequent visit and fruitful interaction with the tribal women of these four villages finally motivated 28 tribal women to give mushroom production a try in their own houses. The selected women were invited to visit the mushroom production unit of KVK, Hazaribag followed by organizing a three-day training programme at KVK campus. Each trained women were provided with 20 medium size bags of spawn to start mushroom cultivation in their houses. The women were encouraged to use locally available materials only for producing mushroom to minimize the cost of cultivation. The KVK staff visited all the newly established units in the villages almost every day to boost the confidence of the tribal mushroom growers. The guidance of KVK and hard work of the women resulted into production of 400 gm of mushroom from each bag totaling 224 kg mushrooms within a month. The surplus amount of 140 kg mushroom was sold by

the women in the adjacent villages and local markets @ Rs.35 per kg. As the climatic condition of Hazaribag is quite congenial to grow mushroom throughout the year except during May to June, the trained women were fully involved in mushroom cultivation to earn a sizeable income for their poor families.

The success of the first venture of KVK, Hazaribag in transferring mushroom production technology opened the door for others not only in the Hazaribag district but also in the adjoining districts of Jharkhand, Bihar and West Bengal. During 2002-03 to 2007-08, the KVK produced 1552.85 kg of spawn from the KVK unit besides production of 2819 kg of spawn from other sources. The produced spawn supplied to 1026 number of mushroom-growers directly by the KVK who had undergone mushroom production training at the KVK. This is in addition to supply of spawn to 26 different organizations working in Jharkhand, Bihar and West Bengal. Of late the spawn production laboratory of the KVK has been given to 3 postgraduate persons from Ramakrishna Mission, Ranchi on contract basis who are producing spawn and making it available among farmers and other organizations. In the year 2008-09, 358 kg of spawn (Oyster) has been made available to the farmers.

Though the initial efforts of the KVK directed towards providing alternative income and employment to the tribal women only, but the programme influenced/ motivated the opposite gender too as a fall out of which both men and women are growing mushroom in the entire district as well as adjacent districts cutting across the boundary. The KVK has played an instrumental role in providing additional income and employment to a large number of people. Besides, Development Departments also rendered adequate support by providing mushroom shed to the growers. Finally, a small but significant endeavour of KVK, Hazaribag proved to be very effective in uplifting the economic status of the tribal people of Hazaribag.

Mushroom grown by tribal women

Orange orchard in rhizome affected hilly areas

Maintaining orange orchard at a large scale is not a very popular practice among the small and marginal hilly farmers of Darjeeling. Such farmers are more interested in cultivating rice, maize, some vegetables and ginger as cash crop. But with the onset of disease in ginger and low returns from traditional crops left the farmers with no other option but to try something different to cope up with day to day recurring expenditure of the family members. Mr. Dil Bahadur Tamang, traditional farmer of Poshyore village of Darjeeling was also used to cultivate the traditional crops like maize, millet, vegetables and ginger in his 2 acres of cultivable land situated in the steep slopes of the hill to feed his family of 8 members and meeting up other expenses. It was until the early 80's when he had to give up ginger cultivation due to outbreak of rhizome rot disease complex against which he had no remedy. Within a span of 6-7 years his economic condition was drastically deteriorated and he could somehow survive with the meager earning from maize, millet and vegetables. He had to manage his family only with Rs.2500/- earned from the cultivation of crops and vegetables in a year. His abject poverty brought him into the contact of KVK, Kalimpong with a hope to bring back prosperity in his life.

Rhizome affected ginger field

Orange orchard in ginger field

Considering the magnitude of Rhizome rot disease in the entire Darjeeling hills the KVK advised him to go for Darjeeling orange tree plantation in his Rhizome rot affected ginger field. At the same time he was encouraged to go for off-season vegetable cultivation, which had adequate market demand like cabbage, cauliflower and round chilli. Mr. Tamang was so impressed with the idea that he put his wholehearted effort to bring water at least from 2 Km. away to his vegetable plot by poly pipes and indigenous bamboo nahlas. Profit gained from vegetable cultivation helped him survive during the growing stage of the orange plants. Finally he started harvesting oranges from 60 mature plants since 1997. The KVK in the meantime trained him on various aspects of vegetable cultivation and orchard management like

nutrient, pest and disease, irrigation and others. The selling of oranges at the rate of Re.1/- fetched him Rs. 18,000/- in the first year. His earning went up to Rs.22, 000/- in 1999 and presently he is having 282 orange plants in his orchard. The success of this orchard has influenced him so much that he has stopped cultivating all the traditional crops and taking up all the vegetables as inter crops. The KVK have extended all possible help and guidance to establish him as a successful orchard grower. The success of this endeavor is perhaps based understood by the fact that he has motivated 10 more other farmers in his village to go for orange orchard. The KVK is encouraging the other farmers also in achieving maximum benefit out of their orchard. Mr. Tamang is happily sharing his knowledge with fellow farmers to help them improve their economic condition. His success has made him an inspiration for the farmers of the entire district and the KVK is using his skill and knowledge to train other farmers as well as linkman for farmer to farmer extension.

Ornamental bird rearing as sustainable livelihood

The devastating natural calamity '*Aila*' in 2008 not only destroyed the islands agriculture and livestock, also brought change in the social system. Forced migration of the men-folks in search of alternate employment in the cities left their counterparts with no other option but to engage in income generating activities whatever was feasible. The vast water resources came in the rescue of the islands women who took collection of prawn seeds as a source of income generation engaging 6 to 7 hours physical labour in the water for a meager income of Rs.300/- per month. This was accentuated with risk of life due to crocodile attack, leaving children alone in the kutchha residence and contamination of skin diseases due to spending prolonged hours under saline water.

The plight of the women of Damkal village, one of the riverine villagers of Sundarbans was also no different. Meeting up the bare necessities of the family members was the hardest problem for the women in the absence of their male counterparts. Death due to starvation was the unavoidable destiny for the destitute families of the '*Aila*' affected villages. Relief work carried out by NGOs and Govt. Departments, somehow, kept them alive. In such dire condition, the intervention of KVK South 24 Parganas led to hope and prosperity among the families for a better livelihood.

As a part of village reconstruction programme during post '*Aila*' period, the KVK visited Damkal village in 2009. The KVK was to assess the resources to initiate agriculture/livestock based development programme in the village. But the ground reality forced them to identify such intervention that could be executed with almost negligible natural resources. Rearing of ornamental birds by the women-fold was adjudged as the potential solution by the KVK to help the women earn additional income with almost no resources and risk of life. To start with the programme the KVK introduced ornamental bird rearing technology with low cost inputs by providing 10 pairs of birds and feed for three months. Training, motivation and continuous interaction paved the way for constructing low cost shelter with net and woods to prevent the birds from predators. Within three months the birds attained saleable stage and the KVK arranged for sale of the birds at Rs.140/- per pair. The earning was spent for constructing a better house for birds followed by purchase of another 20 pairs of birds at a subsidized rate. The idea of rearing ornamental birds triggered the wave interest among other women of the village and they themselves approached the KVK for imparting training on ornamental bird rearing. The trained women were provided standard number of earthen pots for laying eggs by the birds as well as water pots and feed for a certain period. Knowledge and measure regarding exposure to extreme weather were also demonstrated to them alongwith health care management. The KVK regularly provided diagnostic help and other advisory services to the farm-women besides regular monitoring the rearing units.

Considering the difficulty of the women-birds rearers in marketing the matured birds, the KVK identified a number of rural youths from that village to train them about proper care during carrying the birds for doorstep marketing.

Low cost house **Scientific House** **Earthen pots for water.**

Ornamental birds rearing initiated among a few women became quite popular in the entire village of Damkal very fast. 'Ornamental Bird Village' in the locality where nearly 50 farm-women are rearing ornamental birds to earn sizeable income. Moreover, the practice is not only confined to Damkal village, women of distant villages namely, Banashyam Nagar, Lakshmipur and Kaikhali have adopted this practice and slowly it is gaining popularity in the mainland also. The marketing through local youths has also created job opportunity for them providing benefit to the women rearers and unemployed youths.

Doorstep marketing of ornamental birds

Paddy-gladiolus a profitable cropping system

Mr. Migwa Tshering Lepcha, a sixty year old farmer of Tashiding village of Kalimpong used to strive hard to provide two descent meals to his family members in spite of putting hard labour for cultivation of crops. He had 1.5 acres of cultivable land with gentle slope and partially irrigated to cultivate rice, maize and summer vegetables. He used to rear backyard poultry with a few fowls, cockerel and chicks alongwith a homestead kitchen garden with a few fruit trees like banana, papaya and jackfruit. All these enterprises fetched him a meager amount of Rs. 4, 5000 thousand which was not at all sufficient to manage his fairly large family. Lack of information and knowledge about scientific agriculture forced him to cultivate local variety of rice of more than 160 days duration followed by local winter maize by broadcasting keeping the land as fallow in between two cropping season. The production of rice and maize was just sufficient for family consumption and as feed for his animals. To meet up other basic requirements, borrowing money from others was the only alternative for him.

Mr. Lepcha alongwith his wife attended a KVK, Kalimpong programme during 1997 and requested the KVK to help them earn some extra money with their available resources for the very sustenance of their family. The KVK in turn, decided to demonstrate the newly developed cropping pattern with short duration rice variety suitable for hilly situation after assessing the micro-farming situation. Considering the resources and expertise of the farmer, the KVK did not disturb the existing cropping pattern but wanted to introduce a cash crop with the system to help him fetch substantial amount for uplifting the economic condition of the family.

The KVK persuaded him to replace the traditional long duration rice variety with medium duration high yielding variety identified by the KVK for a better yield as well as incorporation of Gladiolus as cash crop. Constant interaction and visit of the farmers to the KVK finally motivated him to give this new venture a try.

The adoption of medium duration rice variety of 125-130 days helped Mr. Lepcha harvest rice by the end of October as the cultivation was started in June, which saved almost one month for him. Soon after the land was vacant he was advised to initiate gladiolus cultivation in that land without keeping it as fallow like previous years. Gladioli were planted during 1st to 2nd week of December in 50 m^2 in the initial year and cut flower was ready for sale by last April to early May. The price was quite high for this early flower and Mr. Lepcha sold @ Rs.2-3 per stick against Rs. 0.75-Rs.1.25 during actual season. The bulbs require one month time in the soil to mature before digging up, dry and store for next season. Hence, his land was free for next crop just in time.

The return from this new cropping system influenced him so much that in the next year he opted for 200 m^2 and with the investment of Rs.3000 – 4000, he was able

to earn a net profit of Rs. 15,160/- from gladiolus cultivation. This additional income not only helped this farm family lead a better life but also inspired the other farmers of the nearby locality so much that within two years 48 farm families of Purbung village adopted the medium duration high yielding variety of rice to fit gladiolus cultivation in the cropping pattern to earn sizeable income from cut flowers. The intervention of KVK facilitated the spread of high yielding variety of rice in the entire sub-division of Kalimpong as well as incorporation of gladiolus in the existing cropping pattern as a promising cash crop.

Gladiolus after harvest of paddy

Regeneration of farming in Tsunami affected areas

The outbreak of *Tsunami* in A&N Islands not only made thousands of people homeless but also forced the farmers to abandon their farming and shift to other vocation whether they liked or not. However, among them a few had the strength to fight against destiny and re-establish themselves in their traditional livelihood. This is the case study of one such farmer who proved that strong willpower with proper assistance/guidance can do miracle in agriculture.

Shri Panchu Ram Jaidhar migrated from East Pakistan (Now Bangladesh) was maintaining his 8 member family through agriculture only. He had 2.0 ha of land under his possession and used to cultivate paddy during dry period using the little water available in his small pond. The earning from agriculture was just sufficient to feed his family. But the outbreak of Tsunami in 2006 came as a bane to him and he had to take shelter in Govt. provided relief camp leaving aside his farm and household.

Pond for irrigating vegetables

Cabbage cultivation

For a considerable period of time he had to depend on the camp as his 2.0 ha of land was inundated with seawater making it unsuitable for farming. However, he was not of the kind who gives up hope easily and blames the destiny. He hailed from a farm family and had full confidence in himself to sustain in such adverse condition. He started keeping touch with a number of Govt. employees entrusted with the job of rehabilitation and could increase the size of his pond with the help of the agriculture department. Initially he thought of harvesting rainwater for its use during dry season for vegetable cultivation as well as rearing of fish to start generating income. The knowledge and skill gained through KVK training helped him initiating this venture. However, he was not at all satisfied with the earning as he needed more money to resettle his farm and family. KVK, CARI of A&N Islands provided him with much needed avenue to intensify agriculture in farming system mode.

Pumpkin cultivation

Okra cultivation

Paying visit to his farm for a number of times and interacting with him for long hours, the KVK prepared a plan in participatory mode keeping in view the resources as well as expertise (knowledge and skill) available with him. The lay out plan was prepared for 1.0 ha area incorporating integrated approach. The implementation of IFS model started with clearing water by chemicals, removing unwanted fish, adding manure (cow dung) and lime as per specification. After checking the water quality of the pond, the KVK suggested to release 600 number of yearlings @5000/ha in 4:3:3 ratio (C: R: M) with the onset of monsoon alongwith 30 number of ducklings. Saplings of banana, guava, custard apple, sapota, lemon and pineapple were also provided by KVK for using the pond embankment with existing coconut tree. Rearing of fruit trees was advised both for income as well protecting soil erosion. The surrounding field was utilized for cultivating 5-10 types of vegetables in different combinations throughout the year. He was further advised to go for aerial cultivation of vegetables for space economy as well as providing shed to the pond to maintain congenial temperature during summer season. He was persuaded to go for low cost compost pit at the backyard for disposing farm and household waste. Within two years he had a cow, 30 ducks, 20 hen and 200 quail birds to enrich his livestock enterprises. He adopted the integrated farming systems with rice-fish-duck-azolla-swamp cabbage-colocasia for the wet season and fish-pond based vegetable-fruit crops system during dry season. He also constructed low cost backyard poultry and quail shed to augment his overall income. The system was so planned as to make the components complimentary to one another reducing the outward cost of cultivation/rearing. Regular follow up by the KVK proved beneficial in providing many fold return from the system. Moreover, the developed system is being utilized for KVK activities also like training, exposure visit etc. and seven farmers have established fish-cum-duck farming in the adjoining villages after being motivated by this system.

Successful planning and proper execution of model/technologies can go a long way to provide better livelihood option through agriculture even in harsh condition-farmer-scientist integration is the need of the day.

Repairing and maintenance of farm machinery proved as successful enterprise

KVK Nawada has been able to develop entrepreneurship among a number of rural unemployed youths of the district. The post training supervision has helped this KVK to achieve this success. Among the successful entrepreneurs Shri Naresh Viswakarma deserves special mentioning as he has not only been continuing his enterprise for a fairly large period, but also created additional employment opportunity for other youths as well. Though he was non-matriculate, could understand the mechanism of machinery with ease. Moreover, he had determination to prosper in life. He used to earn some money by repairing mostly bike and scooter but income was not at all regular. He was more approached for voluntary service than pay for work. He came to know about KVK Nawada from one of his friends who interacted with KVK many a time for farming. Inquiring about the details of KVK activities from his friend, Shri Viswakarma approached KVK Nawada for formal training in any off-farm enterprise. Non-possession of any agricultural land was the reason behind opting for off-farm enterprise followed by natural liking towards repairing work. The KVK offered a number of enterprises for such training from which he selected the trait of repairing and maintenance of diesel pump set and farm machineries. The accommodated him in one of the long duration vocational courses and provided training on repairing and maintenance of diesel pump set and farm machineries for three consecutive months. In the workshop, he used to work beyond training hours to master the technique of repairing and maintenance of farm machinery. In the later part of the training, the KVK even used him as expert for other participants.

A view of workshop

Observing the expertise gained by Shri Viswakarma, the KVK encouraged him to establish a workshop at nearby Roh market on roadside. Initially he had to borrow money to establish and run his workshop. The KVK also advised the farmers to get their machineries repaired at his workshop. Slowly his repairing work started getting recognized in the locality and farmers started showing confidence in his repairing work. In the next one year he earned sufficient income to repay the loans and start expansion of his workshop. With the time he engaged 10 youths in his workshop and train them also to provide door-to-door services to the farmers. The expertise gained by him is regularly being used by the KVK also as a master trainer and the workshop as a place for practical training for the trainees. The help and assistance provided by the KVK have made Shri Viswakarma a successful entrepreneur for the others to follow.

Rural youth self employed through seed production

Shri Sarat Chandra Mahato, a tribal youth of a rural village (Lalbazar) of Purulia District of West Bengal had to support his family through crop cultivation. But agriculture in that part of the district was not at all a profitable enterprise as soil fertility status was very poor and cultivation was totally rainfed in nature. The farmers could harvest only one crop as frequent drought was almost the regular feature prevailed in this district. Shri Mahato though wanted to shift to other profession, scantly household resources and lack of education forced him to stick to his parental occupation only. During 1999 when the Krishi Vigyan Kendra, Kalyan adopted Lalbazar village for overall agricultural development, Shri Mahato came in contact with the KVK for the first time. Impressed by the working plan of the KVK, he approached the KVK for a suitable alternative to farming. After visiting his place for a number of times and assessing the resources (i.e. land and labour) of Shri Mahato, the KVK advised him to go for seed production of rice in his low and medium land.

Seed production of paddy

Seed production of mustard

They explained every detail of this new approach alongwith the marketing aspect of produced seed. They also assured him of providing adequate skill training and other inputs from KVK to help him to establish the new enterprise. After consulting his family members, elders and others he finally decided to go for seed production. Observing his willingness and interest, the KVK trained him in seed production technology. After formal training he was initially provided with foundation seeds of Swarnamasuri (MTU 7029), a HYV of rice, fertilizer and required quantity of plant protection chemicals for his 0.66 ha of land. Under the supervision of the KVK, Shri Mahato got the double yield of rice in 2000 compared to the yield of local low yielding variety he used to cultivate during the previous years. As an effort to boost up his confidence the KVK bought back all the produce at a higher rate helping him to earn a net profit of Rs.16, 660/- from rice seed production. This was in addition to earning a meager amount of money from cultivation of seasonal

vegetables. This success not only motivated Shri Mahato to further produce rice seed but also influence another four tribal youths to take up this profitable enterprise. In the year 2001 all of them were supplied with foundation seed of the same HYV of rice by the KVK. Moreover, necessary initiative was also taken in the next year to enroll them as registered seed growers from the District Seed Certification Officer under the office of Principal Agricultural Officer, Govt. of West Bengal as well as to assure supply of fertilizer on loan basis. During 2001-02 the farmers have earned a net profit of Rs.74, 955/- by producing rice seed from 2.97 ha of land. This success has infused so much confidence among them that they are now producing seeds for another two HYV of rice (CR 1001 and CR 1009) besides the seeds of Mustard, Black Gram, Red Gram, Groundnut, Dhanicha, French bean and Elephant Foot Yam. Moreover, they have taken up other development programmes also through Lalbazar Adibasi Club like formation of farmers club, women SHG, Nutrition Garden by women, NADEP composting, Vermicomposing, etc. The success of a single individual has created so much impact that the entire village has been changed into a model agricultural village with a number of additional income and employment generating enterprises. The tribal youths have shown that selection of appropriate agriculture based avocation can bring prosperity among the entire community.

Self employment through broiler farming

KVK, Bankura of West Bengal though has trained good number of rural unemployed youths for making them successful entrepreneur; the outcome was not very encouraging. However, the situation changed when Mr. Manik Kundu of Tentul Muri village of Bankura came in contact with KVK, Bankura for training on broiler bird farming. Mr. Kundu had 2.33 acre of land scattered in four locations for which he was unable to gain any return from traditional agricultural practices. Moreover, the situation became worse with the un-availability of rain water for last 2-3 years. Finally he decided to go for poultry farming leasing out his land to other farmers. After undergoing training for three months in a phased manner in KVK, he was exposed to other successful poultry rearing practices by the KVK for bringing confidence in him. In the year 1998 he gained sufficient confidence to start a broiler poultry unit with 200 birds. The KVK also helped him getting financial support from the bank. The KVK provided other supports in his new venture like providing information about chicks, feed and vaccines. Slowly he started expanding his unit with the profit of first stock.

Poultry Chicks

Broiler bird at Poultry

He managed his unit in such a way that at any time of the year the stock was always of 2000 birds. Since 1998 he had sold birds for rupees two lakh which fetched a net profit of Rs.1, 25,000/- in last five years. Even during the panic period of 'Bird Flu' he did not clear the stock and took utmost care for the survival of the birds. This wise decision paid him rich dividend as the price went up after a short period. This success has not only brought prosperity in the life of his family in terms of pucca dwelling house, motor bike, colour television and other luxurious household items, but also inspired other youths to give poultry farming a try for self employment and secured livelihood. KVK Bankura is also using his farm as demonstration unit for its trainees.

Self employment through seed production

Mr. Mohammad Nayeem, a matriculate of Daulatpur village of Hajipur block, Vaishali district of Bihar was engaged in vegetable cultivation (cauliflower) for earning bread and butter for his family. In spite of putting his best effort, he could not earn that much to support his fairly large family. Though cauliflower had good market in Hajipur but production was so less that he could hardly earn any profit out of it. During 1986, he came to know about Sartaj Seeds Farm, an organization engaged in producing and supplying certified seeds of cauliflower to the states of Maharastra, Madhya Pradesh, Andhra Pradesh and Others. Mr. Nayeem liked the idea and approached KVK, Vaishali for this enterprise. The scientists of KVK encouraged him by providing training on quality seed production of cauliflower in his piece of land. KVK also provided him foundation seed of cauliflower alongwith chemical fertilizer and micro-nutrient (Borax) to control hollow heart disease of cauliflower. Proper supervision both by Mr. Nayeem and KVK scientists helped him to produce good quality cauliflower seed. Observing the demand for such seed he took lease of a big land to produce this seed in a large scale.

A cauliflower field for seed production

The KVK has helped him to obtain certified seed producer certificate also which has helped him to supply seeds in the states of Maharastra, Madhya Pradesh, Andhra Pradesh and others with a substantial profit. Though he did not produce hybrid seed of cauliflower, the seed produced by him had very good taste and flavour which was liked by others. This success led him to produce wheat seed (RW 346) also and the farmers of Vaishali had recorded the yield on high as 69 q/ha from this seed. Now he has become not only self-sufficient in earning but also living a prosperous life alongwith his family members by producing seeds from 1.5 acres of land. He has also been awarded by KVK and State Agricultural deptt. for his remarkable success in agriculture. His success has also been appreciated in the Gaonkari Magazine of Maharastra and weekly Magazine of Jabalpur Express and Krishak Jagat of Madhya Pradesh. He is known in the entire district of Vaishali as a progressive certified seed producer of wheat and cauliflower.

Self-made woman through supply of mid-day meal

Smt. Manjit Kaur, a housewife with husband and two children was living happily in Port Blair, A&N Islands for ten years looking after her small family migrated from Punjab following a request made by Gurudwara Committee of Port Blair. But the internal problem of the Gurudwara forced her husband to leave the job and within the next one year the entire family turned into destitute. Education of the children had to stop for treatment of her mentally challenged husband. The situation became so very acute that she had to leave Port Blair and take shelter in a village 30 K.M. away from the city to find the job of maid servant. Somehow she could manage a petty loan to purchase a pair of bullock and selling milk to the neighbouring houses was her only livelihood option. With the onset of Tsunami, she had to sell the buffalos also due to acute scarcity of feed and fodder. The entire family left with no other option but to starve.

Preparation of handicrafts by the members of SHG

Krishi Vigyan Kendra under Central Agricultural Research Institute, Port Blair conducted off-campus training on nutritional recipe making, pickle making, compost making, handicrafts making, poultry and goat rearing, cultivation of horticultural crops for the Mahila Mandal of that village to empower the farm-women through small scale enterprises. Smt. Kaur participated in that training as non-member of the Mahila Mandal and at the request of the Mandal as well as KVK, she became the member of the Mandal. Sensing the opportunity to earn, she started mobilizing other women of the village and with the encouragement of the KVK, she formed Yamini Self Help Group. She along with other SHG members attended a few more training programmes conducted by the KVK and finally started poultry and goat rearing in the backyard to have decent income by selling egg, fowl and kid. Meanwhile, support from KVK, CARI and financial assistance from Yamini SHG emboldened her to successfully bid for supply of mid-day meals to school children.

Though the award of this work provided her much needed economic-stability, very soon she started facing problem of assured fuel. The supply of LPG was not at all regular followed by high cost of transportation from Port Blair._Collection of firewood was also not a feasible option for her as it was laborious as well as prohibited. Again KVK, CARI came in her rescue and took her concerned state department for subsidized small bio-gas plant. After regular persuasion, she was granted subsidy of Rs.6645/- with the condition that rest of the expenditure to be met by the beneficiary concerned. That was also a too much ask for her. Considering her situation, Calcutta Urban Services, a NGO came forward to help her out by providing required financial assistance. Finally, the bio-gas plant became operational in 2006 for regular supply of fuel at a much lower cost. Mrs. Kaur, with the help and cooperation of KVK, CARI, NGO and district line department has not only become an example for other women but also provided employment opportunity to a number of unemployed girls. The assistance of KVK, CARI as a 'change agent' has brought real prosperity in the life of Mrs. Kaur and in the village.

Successful practice of Integrated Farming brought prosperity

Sarat Purkayat a traditional farmer of Mathurapur village, S-24 Parganas had to support a family of 12 members from a meager land of 0.26 ha through agriculture. The land was low lying and highly saline with no irrigation facility during the dryer months. His average income from traditional paddy cultivation was only Rs.1200/-. As he did not have any other option he used to work as daily labourer in others' field. He also migrated to city for trying his luck but could not prosper. During 1998 KVK South parganas, while promoting the land shaping programme in the low lying areas of the Sundarbans, approached him to transform his land into this agro-technology with technical and half of financial support. The entire plan was thoroughly discussed with his family members by the KVK which made him as well as family members convinced of the advantages of this sustainable integrated approach. Following the guidelines of the KVK he cultivated HYV of paddy in the kharif season and chilli during rabi season.

Integrated farming system

He earned a total of Rs.6000/- in the first year. In the next year he started banana cultivation on pond embankment which fetched him an additional income of Rs. 600/-. In the meantime he was trained in fishery and Animal Husbandry by KVK which helped him rearing fish and prawn along with duck in the excavated pond. After two years, three dimensional cropping approaches were adopted by him as per the guidance of the KVK. Since last 5 years (from 2000 onwards) he has been cultivating high yielding paddy in the raised land, beans in the land embankment, bottle gourd as aerial crop /vegetable and ridge gourd on pond embankment along with banana. He is now busy through out the year along with all his family members in his newly adopted farming system based on land shaping technology.

He is earning a net profit of Rs.18, 000 to Rs.20, 000 per year from his small piece of land. Besides earning prosperity in his family, Shri Purkayat is advocating for the adoption of integrated farming systems in the similar agro-ecological situation with good success among the fellow farmers. His farming system has turned into a model system for the other farmers to learn about the benefit of integrated farming system.

Sustainable livelihood through farming

Rajpara is a predominantly agriculture dependent village of West Midnapore district of West Bengal. The village was having 550 households with nearly 1700 populations. The literacy rate was around 38% with 3-4% above higher secondary level and 1-2% was graduate. The poor socio-economic condition can be best understood by the fact that no health care facility was available in the village and the villagers had to travel 28-30 Km. to get medical facility. In the entire village not a single road was pucca and life used to come stand still during rainy season. Hardly any sanitation facility like drinking water and other basic amenities were available in the village. Agriculture though was the main stay of the villagers but it was just at subsistence level to somehow feed the village population. Monocrop of rice with local varieties of chalidhan, bhutmuri etc. were the main varieties with productivity of 15-17 q/ha during pre-kharif and jhingasal, tikon nadir, jhanthi, jhingasal, babailata etc. during kharif season with 20-22 q/ha yield. But the small landholding hardly allowed the farmers to fetch this amount of harvest. During rabi the fields used to be kept fallow as no irrigation facility was available and rain water was the only source of irrigation during kharif season. The livestock production scenario was also of no difference as indigenous breed of bullock and cattle were not sufficient to meet the requirement. In fishery also traditional fish species were reared in unscientific manner with very little yield. During 1995-96 KVK, West Midnapore adopted a number of villages in and around the village Rajpara to introduce scientific agriculture, animal rearing, pisciculture and other entrepreneurial activities for the development of that block. Coming in contact with other villages, the farmers of Rajpara came to know about KVK West Midnapore (Kapgari) and approached the KVK for initiating agricultural activities in that village.

After assessing the ground realities of that village the KVK prepared a development plan for overall agricultural improvement of the village. The plan constituted of adequate training, demonstration, on-farm trial etc. alongwith other aspects like taking up infrastructure issues at panchayat, block and district level. The KVK targeted agricultural development first with introduction of improved / high yielding varieties of rice like swarna, IET-4786, satabdi, parijat, MW-10, IET-1010, lalat etc. which had yield potentiality of 35-40 q/ha in kharif. Maize and groundnut were also introduced during this season with varieties like Birsa-1, hybrid maize and JL-24, TAG-24 etc. Alongwith a number of vegetables were also selected like brinjal, ridge gourd, chilli and lettuce. The KVK conducted series of training in the village for the farmers on different aspect of farming, animal rearing, fish cultivation, poultry rearing etc. The farmers with the training of KVK as well as quality seed provided by the KVK could harvest nearly 40 q/ha yield of rice, 25-28 q/ha yield of maize and 18-20 q/ha of groundnut in next two years. The production of vegetable was surplus for the first time in the village and the farmers sold the produce in the local market instead of purchasing from the market. The success of kharif cultivation influenced the farmers so much that they wanted crop cultivation during rabi season also.

However, lack of irrigation facility prevented them from having rabi crop during the year. The farmers approached the KVK many a time for rabi cultivation and the persistence of the farmers forced the KVK to take up irrigation issues with line departments. Constant persuasion both by the farmers and KVK officials finally convince the district agriculture department to sanction a deep tube well and 7 shallow tube well for irrigation purpose. The farmers of their own dug 4 sizeable wells for storage of water. After 3 years a sizeable area of the village farm could be covered with irrigation facility and as per advice of KVK the farmers started cultivation of rice (variety IR-36, IET-476), wheat (sonalika, UP-262, Rajlakshmi), mustard (B-9, mahyco-203), potato (kufrijyoti, pikhraj), groundnut (JL-24, TAG-24, AK-12-24), Sesame (tilotama, improve selection-5), lentil (subrata, asha) and moong (K-861, pusa baishakhi). In animal husbandry sector the KVK trained the farm women and landless labourer specially on goat and poultry rearing to have additional income. In fishery the KVK formed women SHG for commercial cultivation of fish alongiwth providing training to the SHG members and other farmers on scientific fish rearing.

The KVK worked with the villagers for almost 10 years for its development. The cooperation received from the farmers, panchayat, block and district helped the KVK to develop Rajpara as a model village with more than 800 households, 3000 population, 85-90 percent literacy rate, more than 100 graduates and sanitation facilities available in 600 households. The prosperity of this village has invited a medical practitioner to open his chamber in the village and establishment of a health centre is on offing. The entire rice based mono cropped system has been turned into double cropped and in some areas triple cropped with cultivation of cereals, pulses, oilseeds and a number of vegetables. The impact of agricultural development programme launched by KVK indicates that there has been 117% increase in cropping intensity with more than 25% higher yield in all the oilseed crops than the district average, 40-45% in cereals, 28-30% in pulses and more than 70% in vegetable cultivation. The adoption of improved agricultural practices by the farmers of Rajpara village has turned it into a progressive village with all-round development in agriculture, animal husbandry, fishery and above all in the socio-economic status.

Integrated farming system

Sustainable livelihood with no-cost technology

Quail in Andaman and Nicobar Islands is reared in almost all the household for its high demand 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 many fold not only in the Islands but also in the mainland. This has created a unique opportunity for the Islands women to rear more and more number of quail birds for the sale of egg and meat both in the Islands and mainland. However, brooding of quail egg is a problem for the quail rearers as they are to travel a long distance to reach Central Agricultural Research Institute, Port Blair for hatching through incubator.

Setting of quail eggs for brooding

Collection of quail eggs

The average hatchability recorded through incubator was 65 per cent followed by survivability of 50 per cent during transport of chicks. In addition to involve additional cost on bring egg to hatching place & back to rearing place. On the other hand, survival rate of naturally hatched chicks (by hen) was more than 73 per cent and average hatchability by this means was more than 66 percent 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 egg for its brooding by hen. Without identifying the quail eggs, the hen starts brooding the eggs alongwith poultry eggs.

Brooding of eggs by hen

Hatching of Quail eggs by hen

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 the hen. The separated chicks are then kept in a separate container with an electricity bulb fitted nearby to provide the required warmth. This practice of brooding by hen has been immensely popular in the Islands and many women are practicing it in their own houses. In this process numbers of quail eggs have been hatched during June'07 to July '08 by Islands women with 66 per cent hatching and nearly 74 per cent survival rate. The details of hatching of quail eggs with date of egg setting, hatching percentage and other information are given in tabular form. This no-cost technology has helped a large number of women to earn additional income from quail rearing in the Islands.

Tribal women sustained livelihood through leaf plate and cup making

This is a story about women SHG comprising of 10 tribal members of BPL (Below Poverty line) family; which was formed in 2003 in Rauta village of Adhaura block in Kaimur district of Bihar. During base line survey in April – May 2003, the tribal women were found with poor socio-economic condition, but eager to fight against poverty through any suitable employment opportunity. Survey of resources indicated the abundant availability of forest leaves suitable for leaf-cup plate making.

The tribal women were contacted and motivated by a team of KVK staff and a SHG was formed in 2003 under the leadership of Smt. Bipti Devi. As an intervention, KVK team identified leaf-cup plate making a viable option for additional employment as well as income generation and accordingly the women were trained by KVK staff for 9 days during 2004. A leaf- plate making machine was also provided to this SHG with the financial support from DST project on self reliance.

Training on Sal leaf plate making

Group monitoring and evaluation were done by the KVK from March 2005-06 onwards. The enterprise of Leaf-Cup plate making was found very encouraging in uplifting the socio-economic condition of tribal women member of SHG. This can be witnessed from the given table.

Women SHG members engaged in *Sal* leaf plate making activity

Position of the family of the SHG's member

Parameter	Before intervention	After intervention		
	May 2003	March 2005	March 2006	March 2007
Average annual income/family (Rs.)	15370	18000	21200	23500
Average Expenditure Annual/family (Rs.)	16500	17000	18500	19225
Average annual Saving/family (Rs.)	(-)1130	1000	2700	4275
Annual Employment in day	180	210	260	270
Average additional income per member	-	2670	5830	8130
Additional Employment (Days)	-	30	80	90

Before intervention by the KVK, the families of the SHG members had to borrow money from others to run their families, as they could not save any money. However, the situation started changing with adoption of cup and plate making enterprise with required training from the KVK, Kaimur. During March 2007 the families could save a sum of Rs. 4275/- from the selling of cup and plate to the nearby market. Besides earning money, additional mandays were also created by this vocation.

The group of 10 members of SHG produced 40,000 leaf plates and 2, 3000 leaf cup in the year 2005. The market rate was Rs. 60/- per 100 plates and Rs. 10/- per 100 cups. The leaf plate production was increased to 80,000 in 2006 and 1, 20,000 in the year 2007.

Tribal women of surrounding two villages namely, Babhani and Konbhabhani were also motivated and inspired by this group and formed another two SHGs- one in each village for employment through Leaf Cup Plate making. Leaf-Cup plate produced by women SHG on Kaimur plateau is of standard quality and its demand is very high in local market. This small intervention on the part of the KVK has changed the life and economic condition of the tribal women of Kaimur plateau. The success of this intervention is being replicated by the KVK in the similar areas to help other tribal women to have additional income and employment for the betterment of the entire tribal community of the district.

Turning into agripreneur proved beneficial

Mr. Satendra Narayan Singh, a law graduate of Chainpur village of Nalanda was unable to decide his profession as he was not sure of success in practicing of law. Moreover, he hailed from a poor family and was the only earning member. Though he had 2 acre of orchard and a small piece of land, he never considered agriculture as a prospering livelihood. He tried his luck in Patna city by establishing a shop, but there also he could not succeed. In between he opted for apiary in his ill-managed orchard but lack of adequate knowledge and skill of bee-keeping prevented him from getting any profit. He was loitering here and there for a steady profession when he came to know about the prospect of medicinal plants from a newspaper. Gradually he started collecting information about this venture from his friends and relatives and finally he was advised to approach KVK, Nalanda for proper guidance. As KVK Nalanda was only 4 Km. away from his village, it was quite convenient for him to witness the activities of the KVK. Finally, he paid visit to KVK and sought the guidance for livelihood development through agriculture.

Medicinal garden of Satendra Narayan Singh

The scientists of KVK visited his place for a number of time and prepared plan for cultivating medicinal plants with oil extraction unit. They advised him to start apiary in the orchard as an additional source for income generation. As per the suggestions of the KVK he rejuvenated his orchard with mango, guava, lemon and pomegranate with proper management practices. In between the fruit trees he started growing a number of medicinal plants like *Safed Musli*, *Sarpagandha*, *Aswagandha*, *Pipli* and others. He also planted *lemon grass* around the orchard. It took two years for Mr. Singh to establish his orchard and apiary the way he wanted to. From third year onwards he started earning from the modified/rejuvenated farm. Initially, he had to depend on others for extraction of oil from medicinal plants but installed a smsll plant of his own in the next year. Apart from securing his livelihood through agri-preneurship, he has employed six youths to look after apiary, orchard and oil extraction unit. The hard labour put by Mr. Singh following the guidance of KVK, he has become an inspiration for the youths of his locality. Moreover, the KVK has also utilized this success in attracting more and more number of youths from various

parts pf the district to give agri-entrepreneurship the needed impetus for providing on and off-farm based livelihood option to the unemployed youths.

Vermicomposting for self employment

In the era of modern agriculture major impetus is paid to popularize and increase the use of organic and bio-nutrient sources in crop production with underlying thoughts to scale down the reliance on chemical inputs, production cost and also uplinking the techniques facilitating conservation of natural resources and environment. In the paradigm of current perspective and need, KVK Cooch Behar had made efforts for last five years to promote and popularize the use of vermicompost as organic and bio-nutrient sources in crop production for household consumption. Endeavours were also made by the KVK to explore the scope of vermicompost production at commercial scale as branded product and its adoption as one of the suitable options for self employment and income by rural youth.

Successive interventions right from selection of target group of respondents to imparting training, undertaking assessment, demonstration and feedback analysis were taken up to popularize and sensitize the technical perspectives of good quality maintaining vermicompost production, its use and marketing.

Vermicompost Unit

A view of Vermi-Agrotech and their branded product

A List of Activities and Participation of Respondents

Intervention	No. of programme			No. of participant		
	Practicing farmers	Rural youth	Total	Practicing farmers	Rural youth	Total
Training	12	10	22	284	161	445
Demonstration	12	1	13	12	1	13
Group Discussion	20	11	31	32	15	47
Total	**44**	**22**	**66**	**328**	**177**	**505**

An overwhelming response was received by the KVK from amongst the target group in the process of all these activities. Out of total 505 number of beneficiaries,

326 number in Coochbehar and adjacent district of Jalpaiguri are now producing vermicompost and using the produce in their fields. Twenty six numbers of school drop-out children are also engaged in vermicompost production at household level. Six number of SHGs and 5 rural youth have come out in producing vermicompost on commercial scale and used to sale their produce to other large production units and thus serving as ancillary to large producers.

Most conspicuous was the performance of 5 rural youth including 1 woman who made commendable achievement and opted vermicomposting as the vocation for livelihood and prosperity.

Anup Kr. Moitri, Dipak Nandi, Biswajit Roy, Safikul Islam and Smt. Pratima Sutradhar are now marketing their produce in the respective brand name "KISHAN", "SWARNA", "UTTARER SONA", "SABUJ SONA", "JAIBO AHHAR". Success of their entrepreneurship definitely deserve a profile of transformation starting from the stage of unemployed youth to successful industrialist and/or businessmen.

A glimpse of production, income and employment generation:

Sl. No.	Name & Address of the enterprise & entrepreneur	Location	Brand name	Source of fund	Year	Production (q)	Expenditure (Rs. in lakh)	Gross income (Rs. in lakh)	Net income (Rs. in lakh)	Mandays generated/ year (*)
1.	Pratima Sutradhar	Vermi Agrotech, Sonari, Cooch Behar-II, Cooch Behar	Kishan	Bank loan (KVIC)	2006	250	0.75	1.25	0.50	625
					2007	1000	2.70	4.50	1.80	3940
					2008	2000	5.60	9.00	3.40	6600
2.	Anup Kr. Moitri	Sri Durga Agro Industries, Dudumari, Marichbari, Cooch Behar-II, Cooch Behar	Swarna	Bank loan (KVIC)	2007	500	1.55	3.00	1.45	1900
					2008	4000	12.40	20.00	7.60	7100
3.	Dipak Nandi	Barabisha, Laskarpara, Kumargram, Jalpaiguri	Uttarer Sona	Self	2005	110	0.31	0.50	0.19	226
					2006	170	0.47	0.77	0.30	470
					2007	200	0.58	0.90	0.32	612
					2008	40	1.01	1.80	0.79	1146
4.	Biswajit Roy	Bengal	Sabuj	Self	2007	80	0.21	0.36	0.15	184

Sl. No.	Name & Address of the enterprise & entrepreneur	Location	Brand name	Source of fund	Year	Production (q)	Expenditure (Rs. in lakh)	Gross income (Rs. in lakh)	Net income (Rs. in lakh)	Mandays generated/ year (*)
		Organic Agro, Singijani, Mathabhanga-II, Cooch Behar	Sona	(submitted project proposal to DIC for expansion)	2008	120	0.32	0.54	0.22	232
5.	Safikul Islam	Kamat Abutera, Dinhata-I, Cooch Behar	Jaibo Ahhar	Self and Bank loan	2007	96	0.27	0.44	0.17	206
					2008	140	0.38	0.63	0.25	318

(*): means mandays generated directly and indirectly per year

All five entrepreneurs have now become not only innovative industrialists or businessmen with high social prestige and esteem, but also deserve to proclaim as employers to job seekers of nearby areas thus making direct impact on surrounding local economy.

Boosted with instances of great success, 8 young enthusiasts and one SHG developed project proposal under the supervision of KVK and submitted the same to Khadi and Village Industrial Commission (KVIC) and District Industrial Cell (DIC), respectively seeking fund support for establishment of large scale commercial vermicompost unit which are in pipelines. Alongside, manifold increase in demand are being received from farmers and stockholders by KVK for supply of vermi spices is another indicative of its flourishing growth and ample scope of its expansion in this area. High return for the avocation and self confidence on ability led to havoc change in the mindset and attitude of the entrepreneurs, they are now concerned about quality improvement and product fortification by means of inoculation with suitable boi-agents. KVK Coochbehar has already received 105 samples from different entrepreneurs for testing the quality of vermicompost they are producing. Similarly the KVK has been receiving constant requisitions from farmers and rural youth for organizing skill development training programmes on vermicompost production both at household and commercial scale.

Appropriate opportunity can be the strength to empower rural youth and women in any time and in any place for sustaining the livelihood status.

Women empowerment through different means

With deep penetration of electronic and print media in the far-flung areas of Bihar, even the rural girls have become conscious about beauty as well as personality development. However, the girls are unable to avail this facility due to lack of sufficient numbers of beauty parlours. This trend of personality development through beautification of rils has been sensed by the school drop-outs and even by the housewives of in an around Bhojpur district. But lack of training facility in the vicinity prevented them from acquiring the knowledge and skill to develop parlours for the women. Moreover, the girls and housewives are not also allowed to attend training programmes at a distant place from the residence. A number of girls requested the KVK to solve this problem by arranging training programme on beautician and parlour to enable them to undergo such programmes in the KVKs which is located at a convenient place. However, initially the KVK was not very keen to take up such programmes as establishment of parlours might require a good amount of investment. Meanwhile National Scheduled Castes Finance and Development Corporation (NSCFDC), a Govt. of India undertaking requested the KVK to conduct a special training programme on women empowerment among privileged women on the society. A number of visit and discussion took place alongiwth interaction with local girls and housewives to finalize the area of training. The KVK proposed the areas like tailoring, vegetable production through SHGs and beautician and parlour for arranging training programmes for self employment. Finally, KVK and NSCFDC agreed to conduct a training programme on beauty parlour for the rural young girls and urban housewives for their empowerment.

The announcement of this training programme by the KVK received huge response as nearly 500 girls both of SC and general caste applied for this course. The KVK had to constitute a committee to select required number of participants based on their economic condition and literacy status. The duration of training was fixed for 90 days and the course contained all the aspects of beautification like makeup, threading, henna, hairstyle, haircutting, bleaching, waxing, skin hair dye, facial, manicure, pedicure, pimple and stain removing etc. After finalizing the course duration and date for commencement of the training a batch of 24 SC women were selected from Bhojpur whereas the second batch another 19 SC participants were selected from adjoining districts of Rohtas and Kaimur. In both the batches, however, 3 and 8 women from general category were also selected respectively. To accommodate other girls another two programmes for mixed group of women were also conducted by the KVK and finally 96 participants were trained during 2006-07 and 2007-08 of whom 65 were from SC category. Before commencement of the training a small beauty parlour was opened in the KVK itself as per the instruction of NSCFDC with all the facilities, equipment and chemicals. Expertise from renowned beauty parlours was hired to conduct this training programme. Special course was

also organized on financial aspects to facilitate the participants to avail bank loan to start their parlours.

Post training evaluation was carried out for 3 consecutive months by the KVK to find out the actual status of implementation of knowledge and skill for practical purpose. It was observed that out of 96 trained women 26 each from SC and general category started their own parlour either from their own resources or availing financial resources for the bank. From rest of the participants 11 from general category and 5 from SC category started serving other parlours in the district. A further analysis revealed that the women spent Rs. 1.0 lakh to 1.20 lakh for establishment of parlours from where their earning Rs. 6000-7000 per month. In the case of others the monthly income varies from Rs.2500-3000/-. It has also been recorded that obtaining training from KVK has helped the women in attracting more number of customers than other parlours. The KVK has also maintained a close contact with all the participants and providing regular guidance in purchasing equipment, chemicals and other necessities. In addition, the trained women are also being invited to act as resource persons for KVK programmes on beautician. The success of this programme has been so far-reached that every day KVK is receiving requests from 20-25 women either through letters or phone calls from adjoining district of Bhojpur to conduct regular training programme on beautician and parlours. The venture has helped a large number of rural girls and urban women to earn a sizeable income from their residence itself without violating the taboo of non-working of women outside their residence.

Training on beauty parlour at KVK

Participants in beauty parlour training programme

Zero tillage – boon for rice-wheat system

Shri Munshi Mahato, S/o Late Shri Holas Mahato, a progressive farmer of village and post Bansdih, Block Markachho, District Koderma, Jharkhand having about 8 acre agricultural land. The major crops grown in *Kharif* was rice and wheat in *Rabi* with gram & linseed in 0.4 ha & 0.2 ha, respectively. He participated in an on campus training conducted by Krishi Vigyan Kendra, Koderma held during 2007 on "Zero tillage (ZT) technique". In the training course, the Kendra demonstrated the zero tillage technique in detail with the advantage of time saving and reduced cost of cultivation. But one training was not enough to change the age old concept "the more you till the more you eat". However, Shri Mahato along with other farmers agreed to observe the effect of zero tillage in the KVK farm. The KVK invited the farmers to witness the practice of zero tillage in the farm. 'Seeing is believing' finally motivated Mr.Mahato to offer his land to demonstrate Zero tillage in wheat by the KVK.

Cultivation using Zero Tillage machine

Zero Tillage machine

KVK, Koderma opted for sowing wheat by zero tillage on that land which remained fallow after late harvest of rice Cv. Swarna Mahsoori (MTU 7029) due to excessive soil moisture. Wheat (cv. K 0307) was sown in 0.4 ha land with zero tillage machine under supervision of KVK. At the time of sowing about 30 farmers were present. The majority of farmers present at site was advocating for conventional tillage (CT) in which farmers in general plough the field at least 3-4 times before sowing wheat and then broadcast the seed @ 150-180 kg/ha followed by planking. In spite of adverse comments of the farmers, the KVK invited them to again visit the field during germination stage. The farmers were surprised to see satisfactory germination which was 2 days earlier than conventional method and dark green colour wheat seedlings. But none of them agreed that this was the effect of Zero Tillage. Some farmers even argued that their forefathers were not fools who strongly advocated for more and more ploughing before sowing wheat.

After 2nd irrigation few farmers changed their idea about the technology after seeing more number of tillering which was more than the conventional method in same variety and profuse growth with less weed population. At the time of harvesting, the farmers present at the site observed that yield of wheat increased to the tune of 21.4% over conventional method (28 q/ha). Mr. Mahato told that ZT saved about Rs. 2940 in cost of cultivation (ploughing –Rs. 2400, seed – Rs. 300 & labour – Rs. 240) and irrigation water as it took less time to flow across the field in no-till compared to normal tilled plots for the first irrigation. As per record maintained by Shri Mahato, Rs.9540/ha was saved in Zero Tillage practice. Success of this technology in the field of Mr. Mahato, village Bansdih not only proved a boon for farmers of the same village but also served as an example to trigger the ongoing efforts of KVK to popularize the technology in the district.

The result of the technique inspired Mr. Maha to purchase a zero till-seed cum ferti. drill machine at the cost of Rs. 28000/-. During next three years, the area expansion recorded under zero tillage was more than 150 hectares with increase in number of ZT machine.

The State Govt. of Jharkhand through the Department of Agriculture announced 50 % subsidy on purchase of ZT machine which further motivated the farmers to go for this technology particularly where wheat is sown late due to late harvest of paddy. KVK Koderma in collaboration with District Line Department has popularized ZT technology in the entire district for the betterment of the farming community of Koderma district.

Zero tillage benefited in multiple ways

Shri Mukesh Kumar of Lakra village of Jamui District, Bihar was a traditional wheat cultivator. But the cost of wheat cultivation was so high, he could hardly earn any profit out of it. He was searching a newer method both for resource conservation and labour-economy in wheat cultivation to earn profit to support his family. This eagerness motivated him to come in contact with KVK, Jamui. The KVK sensing his positive attitude advised him to adopt zero tillage technology for wheat production. The KVK staff explained in detail about the advantages of this technology in terms of better yield and low cultivation cost. He was also introduced to other wheat growers who had adopted this zero tillage technology. Interacting with them and witnessing the advantages, he finally decided to adopt this technology in his field. Accordingly, KVK Jamui provided a short duration training course on resource conservation through zero tillage to help him acquire adequate skill in zero tillage technology.

Practical training on ZT machine is going on

The KVK supervised all the activities 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 ploughing. This saved Rs.1200/- in one acre of land. He also saved 30 kg of wheat seed and 30 kg DAP (total cost being Rs.800/-) in the first phase of wheat cultivation by applying zero tillage method. 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%. The net income from wheat by adopting zero tillage technology was increased upto Rs.2000/- per acre. Thus his annual income from wheat cultivation was increased from Rs.9000/- to Rs.11, 000/-. The 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 Rs.16000/-. The modest beginning to popularize resource conservation means through zero tillage technology with one farmer, the KVK could motivate more than 20 farmers to adopt the technology in late sown wheat cultivation. The KVK also made the information available to the farmers about the scheme of state Govt. to provide ZT machine at a subsidized rate which was gladly accepted by the farmers. It is an achievement for the KVK who has proved that if the farmers are adequately trained and motivated, the front of technology dissemination and adoption can make wonder.

Zero tillage proved beneficial for farmers

The farmers of Bhojpur district of Bihar was unable to get adequate production of wheat due to late sowing of wheat. Late recession of rainwater often delayed harvesting of rice resulting into low yield of wheat. The problem of low yield was reported to the KVK by farmers from a number of blocks for finding a suitable solution. The severity of problem motivated the KVK to opt for resource conservation measure in the form of zero tillage technology to enhance the yield of wheat in rabi season.

A zero tillage machine was purchased by KVK Bhojpur in the year 2001-02 for its use in the KVK farm particularly for wheat cultivation through resource conservation means. The farmers from a number of villages were invited to witness the operation of the machine as well as to create awareness about the zero tillage technology. Sensing the interest among the group, the KVK offered training to the farmers to describe the utility of the machine, particularly for late sown wheat. Though the farmers were impressed with the technique, no body volunteered himself to give it a try in his own field. However, the KVK decided to stick to the job of popularizing the technology and the farmers were regularly invited to compare different stages of crop growth at KVK farm. Finally a group of six farmers from two different villages agreed for a demonstration of ZT machine in their field for wheat cultivation. An area of 8 hectares was brought for the first time in the district under zero tillage technology.

Cultivation using zero tillage machine

Hand on training on resource conservation means

With the beginning of one ZT machine, the KVK got another 3 machines and in 2002-03 an area of 84 hectares were brought under it benefiting 62 farmers from 5 villages. The cost-saving tillage technology started becoming fast popular among the farmers and the numbers of machine got increased. Assessing the interest of the farmers as well as considering the importance of ZTT in wheat cultivation in late sown condition, KVK Bhojpur arranged for 56 machines for the farmers from different sources including line departments and private agencies. In 2008-09, District

Agricultural Office made 72 ZTT machine available for the district as per the requirement placed by the KVK. Slowly but steadily the area under ZT for wheat cultivation (in late sown condition) was increased manifold with number of farmers and number of villages. The ZT has so much been popular that in 2008-09 the local fabricators have sold 95 machines to the farmers.

The extreme form of minimum tillage is 'zero tillage'. In zero tillage, soil retains desirable physical properties which warrant minimum primary tillage. This method is particularly suitable for sloppy lands where soil and water erosion are heavy. Besides, it increase soil fertility, controls *Phalaris minor* and provides higher return than conventional tillage. The late recede of water in Bhojpur district often delays the cultivation of wheat in rabi season for which use of ZT is ideal. The efforts put by KVK in popularizing this cost-economic technology has brought 21,800 ha under ZT with involvement of 9600 farmers spread over 306 villages. Initially though only wheat cultivation was considered by this method, the KVK has successfully proved that crops like lentil and gram can also be taken up by zero tillage with minimum cost of cultivation.

A housewife turned into social activist for agricultural development

'KVK Munger transformed me to what I am today' – Jaya Devi openly admits. However, her determination, zeal and dedication for social work made her a successful social activist.

Marriage at the age of 12 after forcibly leaving school to a daily wage labourer was not the end of her life like other girls of her community. Instead, she took it as a challenge to overcome the odds of life with the support from her husband. Jaya Devi hails from an extremely backward community of Dharhara Kol village of Munger district which is hilly, surrounded by forest and characterized by difficult terrain. Facility like drinking water, electricity and irrigation water was a distant dream to the villagers. Working as daily wage labourer was the only livelihood option for both men and women to sustain their families. Jaya Devi also took up the work of daily labour after her marriage but was not at all satisfied with the uncertainty of income. Visit of KVK staff to her village came as blessings to Jaya Devi to try something different.

Interaction with the villagers by the KVK staff regarding development of off-farm enterprises through the natural resources available in the village impressed Jaya Devi so much that she approached the staff to include her in their planning to develop the village. Considering the resources available with her, the KVK advised her to start household dairy and arranged two cows for her. This was the beginning of her turn around. To seek advice about rearing practices, she started visiting KVK and came to know about agricultural technologies like HYV of crops, crossbred cow, goat rearing practices, value addition, integrated pest management, regular bearing mango varieties, formation and nurturing of SHG and other women-related activities. She volunteered herself both for formal and informal training offered by KVK Munger and other agencies to initiate change among the villagers, particularly among the women for better livelihood. To begin with, she formed self-help group of the poorest women of her village and encouraged group activity for the benefit of all the members. The response of the women towards self-employment encouraged her further to form more number of SHGs in the village followed by inspiring the villagers to undergo training at KVK and adopt improved cultivation practices. She also contacted NABARD as well as CRADALE and Nofre Dame Health Centre, NGOs working in the district for providing financial assistance and minimum health care facility for the women of the village. Her continuous persuasion with KVK, Munger, NABARD and other NGOs fetched agricultural and socio-economic support for the entire village. Within fifteen years, she catalyzed more than 30 SHGs, 6 watershed to cover an area of 5000 ha for improved agricultural practices and plantation of 25000 fruit trees (sampling) in her village. The endeavour of Jaya Devi started at the age of 12 years got recognition at the age of 33 years when she was bestowed with National Youth Award in 2008-09 for her contribution in the field of environment protection and rainwater conservation from the Ministry of Youth Affairs & Sports, Govt. of India. Her untiring contribution was also honoured by a prestigious Fellowship from the Jamshedji TATA National Virtual Academy on 4th December, 2009 for her invaluable service to the cause of spreading revolution in rural India. Besides, she was selected for a training-cum-exposure visit to Cheonan,

Seoul and other cities of South Korea in 2010 to get exposure with Vision of Global Citizenship. Her self-less dedication towards socio-economic development of poor rural people has been acknowledged by the organization like Art of Living Foundation and Red cross who have roped her in relief work among the poor.

Smt. Jaya Devi interacting with KVK staff

The feat of Jaya Devi has not only brought prosperity among the backward/poor people through agriculture and other social work, she has become a role model and noted social activist in the entire district as well as in the country. Her feeling for rural people has become a lesson for all and cutting across the caste and creed, people salute to this noble lady for showing them the path of development.

Tailoring – a means for livelihood development

Smt. Asha Devei, a tribal housewife of Sarukhudar village of Bishnugarh Block, district Hazaribag never thought of venturing into enterprise development till 2000 when her husband lost his job and it became very difficult to maintain her family with a meager income of Rs.1000-1200 per month from their small piece of cultivable land. The destiny forced her to go out and search for any work to support her family. Her family obligation took her to KVK, Hazaribag where the tribal women were being trained towards self-employment through off-farm activities. Interaction with the KVK arouse interest in Smt. Asha Devi to learn tailoring and stitching of garments as a potential future to earn money. The KVK accommodated her in one of the long duration (3 months) training programmes on tailoring and stitching alongwith other women. The KVK trained her in all aspects of tailoring and stitching including market of raw materials, sewing machine etc. Though she successfully completed the training, she remained engaged in farm and household activities after going back to her residence. The KVK as a follow up activity visited her place in the end of 2000 and was surprised to observe that the training was an wastage. While enquiring the reason, it was revealed that lack of confidence and want of money to purchase sewing machine prevented her from taking up tailoring as profession. Considering her economic condition, the KVK arranged for a sewing machine on loan basis and again invited in the KVK to refresh her skill. The KVK also persuaded an ex-women trainee of nearby village to help her out during the initial stage of tailoring of garments. The arrangements made by the KVK infused sufficient confidence in her to open a tailoring shop with one sewing machine. Gradually she became expert in tailoring and stitching of garments of girl children. KVK used to visit her place every now and then to ensure that she does not leave the work. Smt. Asha Devi also visited the KVK to learn about women design of frock, skirt and other ladies garments. Within a span of six months, ladies and girls started flocking into her shop both for their garments to get stitched with new design and learning tailoring and stitching from her. Sensing the opportunity to earn more, she opened a tailoring centre with three new machines and started teaching 10-12 girls and women in 2-3 shifts about tailoring in 2004. Her monthly income increased to Rs. 4000-4500/- per month from her own tailoring shop and teaching centre. The KVK, Hazaribag also recommended a number of girls to learn tailoring from Smt. Asha Devi which enables her to open another three centres in nearby village by 2005. Slowly but steadily she expanded her enterprise of tailoring to another three villages for teaching the girls and women about tailoring. Since 2004 to 2010, she has trained more than 300 women and girls of nearby villages of whom 140 women and girls have started to stitch garmets for earning money and the income varies from Rs.3000 to 6000 per month. She has bought 6 more sewing and embroidery machines fitted with motor for faster operation of the machines. She has employed six girls to assist her in managing her own shop as well as supervising the training centers. Her popularity in the locality has so much spread that even the gents are getting their garments like pant, shirt, coat etc. stitched from her shop. In any given month, she earns not less than Rs.10,000 from her own shop and during the festivals like Durga Puja, Diwali, Muharam, Christmas and others, her income increased to more than double. KVK, Hazaribag is projecting her success to all the aspiring women who want to be self-employed.

Smt. Asha Devi in her tailoring shop

Smt. Asha Devi providing training on tailoring

A modest beginning of Smt. Asha Devi with one sewing machine and technical skill imparted by KVK Hazaribag has led to prosperity not only in her own life but also to all those women and girls who have become self-employed through Smt. Asha Devi.

Dairy farming – a sustainable enterprise

Dairy farming as a sustainable livelihood option not even came in the dream of Soumya Kanti Banerjee, a youth of Churamonipur village of Bankura district of West Bengal. But the stash reality of life brought him into this business, with enviable success. Termination of job of his farther from Chukha Hydro Power Corporation, Govt. of Bhutan in the year 1996 forced Shri Soumya Banerjee to abandon his study after secondary education. His father tried his best to continue his study with the income from 1.6 ha of land but 'Operation Barga' followed by traditional monocropping of aman rice only made him helpless even to provide food for his family. Realizing the need to support the family, Sri Soumya Banerjee started seeking job but his education up to secondary standard was hardly adequate to find any opportunity. He tried his luck even outside West Bengal also, but forced to return back to his native place after four years giving up the hope of any suitable engagement. One day while passing by the side of KVK, Bankura he observed that good number of young people was interacting with the KVK staff of whom a few were known to him. Sheer out of curiosity he entered into the KVK premise and could came to know that they had come for obtaining training from the KVK. Further interaction with his known fellows, he got a fair idea about the KVK and decided to personally inquire about any prospect out of training. A few days later, he approached the KVK staff and narrated his present situation as well as sought assistance to have a meaningful employment for the very sustenance of his family. After detailed discussion, he was advised to opt for dairying that had good prospect in the locality. He decided to follow the suggestions of the KVK and requested to provide required knowledge and skill about dairy farming. The KVK alongwith other participants trained him on dairy management in 2002. The knowledge and skill provided by the KVK made him confident of taking up dairy management as his livelihood option. However, the required financial support prevented him from venturing into this new enterprise. The KVK again came into his rescue by preparing a project for obtaining soft loan from United Bank of India, Sonamukhi Branch, Bankura. The technical feasibility and assurance of KVK finally convinced the bank to sanction Rs. 60,000/- as soft loan to Sri Soumya Kanti Banerjee. He started his enterprise by purchasing four number of cross-bred cow in 2003. Since hen, he has engaged himself in production of cow milk with the assistance of KVK Bankura like incorporation of vitamin and mineral mixture with concentrated ration of cows to augment milk productivity, medicine for controlling ecto and endo-parasites etc. His business of milk production started expanding from 4 to 8 cross-bred cows and 4 number of mulching buffaloes with production of 35-40 kg milk per day. Half of the total milk production he sold to household consumers and rest he used to convert into milk products like paneer @ Rs.140/- per kg. In the next year he purchased a fat separator machine for preparing 'ghee' to sell @ Rs.330/- per kg. Gradually he started selling other value-added products like 'khowa', 'dahi (curd)' and 'chhana'.

Soumya Kanti Banerjee in his Dairy unit

Soumya Kanti Banerjee in his dairy processing unit

In the next year he opened of his own one marketing outlet for his value added products besides continuing with setting of milk. As of now he has engaged two unemployed youths for looking after the marketing of milk-made products and two more for preparing the products. His profit out of dairy enterprise is more than Rs.2.00 lakh per year which has helped him supporting his family in all respect. His success has not only been confined to his household alone, 21 numbers of milk producers/traders of adjoining locality have taken up value-addition of milk in the form of 'paneer' and selling it to Durgapur city market of Burdwan district. The success of Sri Soumya Banerjee has influenced the local youths so much that they are regularly approaching the KVK for initiating off-farm enterprise development as an alternate livelihood. The KVK, in turn, exposing the trainees towards the success of Sri Banerjee to motivate them towards self-employment. Thus, a modest beginning on the part of Shri Soumya Banerjee made him a successful entrepreneur for others to follow his example.

Vermicompost production – A boon for the farmers

Nadia district of West Bengal is one of the highly intensive cultivated districts with 256 percent cropping intensity. Consumption of inorganic fertilizer per unit area is also very high which has led to poor organic and mineral content in the soil. Hence, supply of adequate quantity of organic as well as mineral matter, is of paramount importance to maintain proper soil health and maintain productivity of crops and vegetables. Recycling of organic wastes in agriculture might be an option to provide much needed organic and mineral matter in the soil as it can directly add organic matter and plant nutrients besides improving physical and biological properties of soil, soil fertility and creating favourable environment for crop growth. Recycling of organic waste, though not a new concept, regained attention in recent past for quantitative and qualitative output of agricultural products. Microbial techniques of composting and vermicomposting of agricultural wastes have been proven to be effective in adding humus to the soil, improving soil condition and plant growth and reducing the run-off and non-point source pollution. The advantages of vermicomposting like a natural and eco-friendly process, a single process that can handle wide variety of organic resources, stable usable product and a balanced food for plants motivated KVK Nadia to popularize production and use of vermicompost at household level for the improvement of soil health and as an alternate livelihood option.

The awareness programme on production and use of vermicompost was taken up by KVK Nadia during 2008 and observing the interest among the farmers, KVK in collaboration with ATMA organized four training programmes for 96 farmers of 6 months duration. West Bengal State Council for Vocational Education and Training was also involved in the programmes with financial support for the training programmes. The KVK organized another nine training programmes on vermicompost production for 360 beneficiaries with the support of State Government. The participants was asked to establish at least one vermicompost unit in their homestead area of low cost construction having 2.5 ft x 3.5 ft x. 1.0 ft bed size to prepare vervmicompost with easily available organic wastes like crop residues, oil cakes, biomass of weeds, crop waste, fruit/vegetable waste etc. They were also advised to use Eisenia foetida earthworm species able to withstand wide range of temperature (4-30^{o}C), humidity (20-60%) and P^{H} (6-8). To encourage the participants, KVK Nadia provided required number of earthworms also from the vermicmpost unit of Bidhan Chandra Krishi Viswavidyalaya.

Initially the staff of KVK regularly monitored the establishment of vermicompost unit as well as production of vermicompost by visiting every household. However, after two cycles of vermicompost production, the beneficiaries became confident to carry out the production procedure of their own. The modest beginning with training followed by establishment of one unit at every household triggered the interest among the rural youths/farmers of the entire village as well as adjoining villages. During 2009-10, 850 tonnes of vermicompost were produced from 263 units and another 70 units in an adopted village of KVK namely, Bhabanipur have been established which are exclusively managed by the women participants. Marketing arrangements made by KVK with National Horticultural Mission, Kalyani

Municipality, Gayeshpur Municipality and a number of nursery growers has helped the producers to dispose off their produce from the site itself. Moreover, the potato growers of neighbouring district, Hooghly also place their orders for its application in potato production. The trained persons are now working as trainer to provide knowledge and skill of vermicompsot production in the entire Nadia district as well as other districts with sizeable consultancy fees. Besides vermicompost, a number of youths are also producing huge number of earthworms for its sale with remunerative price to other parts of the state. Two of the trainees are supplying earthworm produced at their own units to Andaman & Nicobar Islands and even exporting in Bangladesh also.

Women interacting with KVK staff about vermicomposting

Women involved in vermicomposting

Initiative taken by KVK Nadia has created visible impact in the entire district both in improving soil health and providing a stable source of income generation for the farmers, rural youths and farm women. A low-cost enterprise has turned into a dependable livelihood option for the overall improvement of farming community.

Agriculture turned into a sustained livelihood

The tribesmen of Birajiya Community, a minority of primitive tribe settled in Netarhat of Jharkhand prefer migrating to town and catties for working as daily labourers to opting for crop cultivation. Very low literacy rate, lack of exposure towards modern-day agriculture and very limited resources with negligible irrigation facility prevented the tribesmen from engagement in other occupation. Rotten meat and coarse rice were the daily diet of the tribes for which they had to struggle throughout the year even at the risk of their lives. But within four years, many of them left behind the old habit and became even vegetarian – thanks to the efforts of Vikash Bharti, a NGO of Gumla and KVK Gumla run by this NGO.

The transformation process started with Sri Biltan Birajiya, 45 years of age, despite having seven bighas of land, never tried to cultivate any crop or vegetable even for household consumption. The situation started changing when the KVK while implementing National Horticulture Mission included the tribesmen as beneficiaries. Repeated persuasion followed by training in crop and vegetable cultivation, somehow, motivated a few of them to adopt the new idea. Under the regular supervision and guidance of KVK Gumla, Sri Biltan prepared half of his land for cultivation of paddy. After decades, he and his family tested rice of their own field. The successful cultivation of rice infused some degree of confidence in him and he readily agreed to go for vegetable cultivation. Seeds of selected vegetables and other inputs were provided by the KVK to sustain his interest in farming. However, after next two years, Sri Biltan did not require any other support from KVK except technical guidance to continue cultivation of rice supplemented with cash crops to increase the flow of cash into his family. The expertise of KVK also transformed Sri Jitan Birajiya into a successful farmer who now grows almost all types of crops to reap multiple benefits. He is very happy as he does not need to work as labourer, rather he is engaged throughout the year for cultivation of paddy, maize, groundnut, pear, mango and several types of vegetables. He has also established small units of poultry, piggery, goatery and vermicompst. Taking up farming in serious manner has not only brought positive changes in his life, he has sent his daughter to residential schools at the cost of more than Rs. 25,000/- to meet the expenditure of hostel and school fees. Sri Bandha Birajiya, a very rich vegetable growers of Langdatand village, Gumla Block does not want to remember the old days when he used to migrate to Punjab as daily-wage labourer. Today he has saved nearly one lakh rupees after expending on all the family needs. He is one of the largest growers of vegetables in his village bulk of which is sold in Netarhat market. His family members are also engaged in vegetable cultivation to earn sizeable income for the family.

Photo graph of succes stories published in Hindustan Times page no – 02 on July 27-2011.

Bitan Birajiya with a Vikas Bharti official at his farm in netarhat on Monday.

The turn around of primitive tribe has been readily due to selfless work of Vikash Bharti and KVK Gumla. The efforts extended by the KVK have brought prosperity into the entire community. The success of such endeavour will go a long way in developing such minor communities spread across the district, state and the entire country.

Multilayer vegetable cropping proved successful

Nipaniya, a predominant agricultural village of Godda district of Jharkhand was no different from other villages except adopting a new technique of crop cultivation – multilayer vegetable cropping. Cultivation of vegetables though was a common practice of the farmers of this village, it was confined to rainy season only a scarcity of water was a major problem in the village. Sandy soil, light reddish in colour, undulated topography followed by deficient in macro and micro nutrients were the characteristic features of the village. Run off loss due to heavy downpour during rainy season and erosion of soil particles due to high wind velocity during summer were the regular feature. Water table being too deep, irrigation facility could not be provided. Vegetables like sponge gourd, ridge gourd, bottle gourd and bitter gourd were mainly cultivated by the farmers alongwith elephant foot yam as solo crop. But the profitability, particularly of elephant foot yam was very low as the local variety had high calcium oxalate content that led to acridity in the product and less market demand. KVK Godda while implementing National Agricultural Innovative Project of ICAR as a consortium partner of Agricultural Finance Corporation Limited, an NGO came in touch with the village Nipaniya in the early 2009. Baseline survey conducted by the Project Implementation Agency and Problems prioritized accordingly revealed that low agricultural productivity, particularly of vegetable crops was the most important problem perceived by the villagers. To have an effective agricultural development plan, the staff of KVK discussed in detail with the villagers and concluded that the local varieties of vegetables and elephant foot yam need replacement with improved ones followed by cultivation of vegetables and elephant foot yam together in the same field. The idea of multilayer cropping system was implemented in the summer of 2009 in the village with marked difference in the yield of both crops. A bamboo and thread-based structure (Mechan) was prepared when the vines of cucurbits became longer for easy climbing and spreading of cucurbit vines.

The success of the idea prompted the KVK to implement multi-layer cropping system through 52 farmers of SHGs formed by AFC Ltd. during next year. The seeds of cucurbits and elephant foot yam were provided by the KVK to the farmers and the layout was prepared under the guidance of KVK experts. Elephant foot yam was planted at 75 x 75 cm spacing and when the plants attained height of 10 cm, ridges were prepared. On the prepared ridge, cucurbits like ridge gourd, bitter gourd and bottle gourd were sown at 1x1 meter spacing.

Cultivation of elephant foot yam with ridge gourd, bitter gourd and bottle gourd proved effective both in terms of enhanced productivity as well as benefit accrued to the farmers. The comparative performance depicted in the following tables indicates that among the cucurbits, bitter gourd and elephant foot yam was the most suitable combination.

Table 1: Yield and economics of vegetables under multi layer cropping system:

Crop	Yield of EFY (q/ha)	Yield of companion	Cost of cultivation	Gross return	Net return	BC ratio

		crop (q/ha)	(Rs)	(Rs)	(Rs)	
EFY+ Ridge	368.0	152	169300	580180	410880	1:3.4
EFY+ Bitter	373.6	148	166400	682320	515920	1:4.1
EFY+ Bottle	327.4	248	173400	662716	489216	1:3.8

Table 2: Yield of vegetables under mono cropping system:

Crop	Yield (q/ha)	Cost of cultivation	Net return	BC ratio
EFY	372	146500	363942	1:2.4
Ridge	158.6	54940	32990	1:1.6
Bitter	156.4	55480	132200	1:2.4
Bottle	277.89	59200	79745	1:2.3

It was observed that furrow in between ridges served as drainage chances to drain out excess water, helped in better germination, reducing seedling mortality and maintaining optimum plant population. Moreover, less compactness of soil on the ridges encouraged extensive root development, well aeration and reduction in disease infestation ultimately increase in yield of both the companion crops. In addition, different root systems (cucurbits being deep rooted and elephant foot yam shallow rooted) of the combined crops helped in utilizing the soil nutrients to great extent. The crop combinations did not produce any adverse physiological activity as well as antagonistic effect affect in its yield.

The multilayer vegetable cropping pattern provided more production per unit area of land. This system of vegetable cultivation is highly suitable for vertical expansion, need of the present situation. The land equivalent ratio was observed to be more than one in this technique of vegetable cultivation. Besides, the multilayer pattern provides a sort of crop insurance to the farmers. Advantages found out in this technique motivated many farmers of Nipamia and adjoining villages to adopt this technique in their field. The performance of this technology impressed the District Collector of Godda district so much that he sanctioned 200 wells for irrigation and drinking purpose. The KVK has been assigned the task of replicating the technology in the entire district and with the spontaneous support of the farmers from various corners of the district, the KVK would accomplish its task within short span of time.

Malviya – 13 proved beneficial for pigeon pea farmers

Pigeon pea is a preferred crop of the farmers of a number of districts in Bihar particularly for less fertile upland and marginal soil. With the local variety the farmers used to harvest an average yield of 13.0 q/ha though the quality was not very good due to wilt infestation mostly during flowering stage. Application of chemicals was not that much effective either controlling the disease of enhancing the yield. In the year of best performance of the crop, average yield of 17.8 q/ha was recorded in Begusarai district of Bihar which was not very satisfactory. Still the farmers used to continue with the cultivation of pigeon pea to avoid keeping the land fallow. KVK Munger of Bihar while assessing the productivity of various crops in the district came across the present problem of wilt infestation in pigeon pea vis-à-vis cultivation of old local varieties year after year. To substantiate the problem, KVK Munger decided to for seed production programme at KVK farm with Malviya – 13, a high yielding wilt resistant variety during 2010. Seed was brought from Rajendra Agricultural University, Pusa, Bihar where only 250 kg seed was available that time. This was the beginning of a new era in pigeon pea cultivation in 13 districts of Bihar namely, Munger, Bhagalpur, Jamui, Nalanda, Begusarai, Araria, Seikhpura, Saran, Vaishali, Darbhanga, Aurangabad, Kaimur and West Champaran. In the KVK farm of Munger, 260 q of seeds was produced of which 168 was in the grade of best quality. Wilt and sterility mosaic incidence was recorded below 3 per cent to convince the KVK to go for large scale cultivation of the variety across the districts of the state. The team of KVK arranged to sell the seeds within two months (June-July) to 13 districts in collaboration with other KVKs and line departments. In the selected 13 districts, 166.6 q of seeds was provided through sale to bring 1045.0 ha area under pigeon pea cultivation with Malviya-13 seeds during 2010-11.

A view of pigeon pea field (Malviya-13)

The team of KVK visited as many field as possible to supervise the cultivation practice of the farmer alongwith line department officials as well as to collect feedback of the farmers through direct contact. The performance recorded by KVK Munger in the selected districts indicated that the average yield obtained by the farmers varied from 20-32 q/ha. The farmers of Munger, however, harvested average yield of 22.0 q/ha. In

terms of increase in yield over local variety, Malviya-13 recorded 83 percent more yield with 111 percent more net return. The success of the variety has been so tangible that during the kharif of 2011-12, 13670 number of armers have gone for this variety against 2534 farmers cultivated Malviya-13 in 2010-11 to cover an area of 8968.0 ha in all the 13 districts of Bihar. The print media has also supported the diffusion of this technology by highlighting the success many a time. The farmers of Munger have turned this variety 'as the best remunerative for upland because no other crop of cereal, pulse or oilseed can give such profit'. Introduction on an appropriate variety by KVK Munger has been proved beneficial for the entire state.

Table: Details of diffusion of technology with benefit

Name of the district	Quantity of Seed sold (kg) in Kharif 2010	Diffusion in				Average yield q/ha during 2010-11		% Increase in yield from local check	Net return (Rs/ha)	
		2010-11		2011-12		Malviya-13	Local var.		Malviya-13	Local var.
		No. of farmer	Area (ha)	No. of farmer	Area (ha)					
1	2	3	4	5	6	7	8	9	10	11
Munger	4000	645	250	3865	2500	22	8.8	150%	48250	12700
Bhagalpur	1000	120	65	375	520	22	11	100%	48250	19300
Jamui	1800	225	115	585	920	28	17.5	60%	66250	38800
Nalanda	8800	1335	550	7655	4400	24	13.3	80%	54250	26200
Begusarai	30	3	2	25	40	32	17.8	80%	78250	39700
DAO, Araria	400	85	25	250	200	28	12.55	180%	66250	23950
KVK, Seikhpura	100	15	6	125	60	25	10	150%	57250	16300
KVK, Saran	100	14	6	140	60	25	11.4	120%	57250	20500
KVK, Vaishali	100	20	6	150	60	22	13.75	60%	48250	27550
KVK, Darbhanga	100	25	6	160	60	25	16.7	50%	57250	36400
KVK, Aurangabad	100	18	6	115	48	24	15	60%	54250	31300
KVK, Bhabua	100	24	6	135	60	20	11.7	70%	42250	21400
KVK, W. Champaran	30	5	2	90	40	20	13.3	50%	42250	26200
Total	**16660**	**2534**	**1045**	**13670**	**8968**	**317**	**172.8**	**12.1**	**720250**	**340300**

Handicrafts based livelihood option

Jute as a cash crop is extensively grown in West Bengal. However, the fluctuating support price in the recent past has forced many farmers to abandon its cultivation and opt for other agricultural crops. But, jute fibre for making a number of alternative handicrafts to empower the women economically was not thought by the women of Ketan village of Burdwan district of West Bengal until they happened to visit stall of SHGs in Kolkata. The products and its sale impressed the women so much that they decided to learn the art of handicrafts making from jute fibre. It was in the year 2009 when they approached KVK Burdwan to provide them with technical expertise in making jute fibre-based handicrafts for their economic benefit. The KVK after detailed interaction visited their village and discussed with the farmers in organizing training programme on jute handicraft making for a duration of seven days exclusively for the farm-women and school drop out girls. Until then, jute was an alien crop to that village and to motivate the farmers towards its cultivation, the KVK organized mass awareness camp, group meeting, visit to jute field in other parts of the district and to Central Research Institute for Jute and Allied Fibres at Barrackpore, Kolkata. The willing farmers were trained both at KVK and CRIJAF with all the necessary support like seeds etc. Once the raw material (jute fibre) was ensured, the KVK organized the training programme for the farm-women and girls. In the training programme, the women were exclusively taught about the intricacies of handicraft making to make it more attractive for its sale in the market at higher price. The women became confident enough to start making handicrafts of their own. The KVK made two Mahila Mandals out of the trained participants to help one another in the handicraft making process besides frequent visit to the village to encourage them and to rectify their mistakes. Within three months, all the participants prepared handicrafts like jute bag, pen stand and other ornamental items. Two of them namely, Namita Lohar and Tanushrree Majhi became so expert that they prepared many other items in good numbers and sold in the nearby towns at a good price. For other women, the KVK in collaboration with NABARD and NGOs orgnanized Grameen Mela (Rural Fair), Mahila Mela (Women Fair) and other programmes for sale of handicrafts. The women earned nearly Rs.2000/- from each fair to support their family. Their success has influenced other women so much that more and more women are approaching KVK for this specialized training. The KVK of its own as well as with the help of already trained women is regularly organizing training programme either at KVK campus or in the villages to sustain this wave of women empowerment through jute fibre based handicraft making.

Training on kantha stitch

Inspired by the success of the Mahila Mandals, a SHG, Navodaya of another village, Jagulipara approached the KVK for imparting training on 'Kantha Stitch' to its women members which had very good market demand, specially for kantha stitch saree and other dress materials of women. The eagerness of the women motivated the KVK to organize another vocational training programme of 7 days duration in the village with hired technical expertise. The women sacrificed their leisure time to learn the technique of kantha stitch and after completion of the training, took up the trait as a source of income generation. In consultation with the villagers, initially arrangements for raw materials (sarees, salwar suit etc.) from the saree traders were made which provided some remuneration for the women. However, with the course of time, Mrs. Jyotsna Chowdhuri and Sakila Begum became so apt in kantha stitch that they started purchasing the raw materials from the market, designed with kantha stitch and sold in the market at a much higher price. The KVK linked the women member of Navodaya SHG with the Grammen mela, women fair as well as opened outlets in the nearby townships. The NABARD also came forward to help the women in selling their produce through these outlets. The initiative taken by the KVK has created positive impact in women empowerment and the womenfolk could find meaningful engagement as well as avenue for income generation to help their families living a more decent life.

Display of handicrafts at KVK Burdwan

Integrated Farming Systems - a successful venture

Sk. Shoyeb Hossain, a rural youth-cum-marginal farmer of Jagulipara village under Galsi-I Block of Burdwan district was not satisfied from the return of his nearly one acre land and pond area including bund area. The pond was mainly used for household purpose like taking bath, washing clothes and utensil etc. with little fish cultivation. The land used to produce season vegetables for household consumption only and he had to spend substantial amount to ensure the livelihood of his fairly large family in spite of having aequate resources which he could not convert into meaningful production unit. KVK Burdwan while searching for appropriate location/resource to develop integrated multi-component farming systems visited the village in 2009 and selected a number of farmers including Sk. Shoyeb to develop model farming systems in their fields. Among all the farmers, Sk. Shoyeb readily agreed to provide his pond and land when KVK explained the benefit of such systems. It was also informed that the role of KVK to be restricted in providing training and planning of the systems, execution part to be taken care by Sk. Shoyeb. With the consent of Sk. Shoyeb, the KVK trained him in Integrated Farming Systems followed by visit to other farmers' field with successful development of Farming Systems model. The KVK also involved line department officials in this venture of initially provide vegetable seedlings, ducklings, IMC fingerlings and tissue cultural banana plantlets to develop crop-fish-poultry and crop-fish-duck based farming systems incurring some expenditure by Sk. Shoyeb. The bund area was utilized for developing banana orchard alongwith vegetables like chilli, tomato, brinjal and turmeric. The feed requirement of poultry birds was met through the pasture allowing free scavenging of the birds.

Pond based IFS model of Sk. Shoyeb Hossain

Intercropping of banana with vegetables at IFS

The multi-component farming systems was so planned and executed as to utilize the waste of one subsystem as input of another. It helped in reducing the risk as well as cost of production besides improving soil fertility, providing balanced nutrition and ensuring higher return from the entire systems. Within next two years the farming systems produced net return of Rs.40,000/- against the initial expenditure of Rs.20,000 to 25,000/- and it is likely to increase manifold in the coming years. Besides a large

number of farmers in and around Galsi-I block, State Govt. officials and implementing agency of MNREGS also visited this systems to replicate this model in 200 ponds of the district alongwith KVK Burdwan of which 20 locations are already identified and the process of developing the model is going on. The success of Sk. Shoyeb has become an eye-opener for other farmers of his block to accept newer technologies for the betterment of their own community.

MGNREGS/State Govt. officials and KVK personnel selecting other areas for replicating the model

Inorganic to organic vegetable cultivation paid rich dividend

In Rohtas district of Bihar, organic vegetable cultivation was an unknown practice even up to a few years back but today 'organic farmers' club' is a common place organization - thanks to Shri Dilip Singh for this transformation.

Son of a landless father, Sri Dilip Singh had to discontinue his study after intermediate to support his family as a vegetable vendor in the local market. The income was just adequate to run his family but he always used to think about improving the economic condition of his family. The idea of vegetable cultivation came into his mind in 1993 and after managing required sum, he took lease a sizeable land to start vvegetable cultivation in Mishirpur village. As the land was less fertile and devoid of assured irrigation facility, in spite of putting best possible efforts he could not harvest that much produce. Still he did not loose his hope and continued vegetable cultivation for another five years. His aspiration and determination to succeed in vegetable cultivation worked as driving force to take land on lease in another five villages, this time better off land to include few more vegetables for cultivation. Involvement of all family members in his endeavour also could not provide the desired output as cost of vegetable production remained very high. At this juncture he came in contact with KVK Rohtas located at Bikramganj, Bihar for guidance in vegetable cultivation to reduce cost of cultivation and enhance profitability. The KVK after visiting the fields suggested him to for organic vegetable cultivation to get quality produce and higher market price. He was also advised to learn the technique of organic vegetable cultivation from IIVR, Varanasi and Department of Agriculture, BHU, Varanasi. He mastered the skill of organic vegetable cultivation from both the institutes and under the supervision of KVK produced quality vegetables like tomato, brinjal, cauliflower, cabbage, bitter gourd, sponge gourd, okra and cowpea in substantial quantity which fetched him nearly Rs.3.0 lakh in a single year. The KVK also helped him linking with the market of Dehradun, Kolkata, Bokaro, Ranchi and Tatanagar for regular supply of organically produced vegetables. Alongwith organic vegetables cultivation he also started cultivating onion and potato in a total land holding of 60 acre to get a net profit of Rs.6.00 to 7.00 lakh per year. Sri Singh in collaboration with KVK Rohtas also developed an okra variety to cultivate throughout the year. He has engaged 25 labourers to look after his agriculture and marketing aspect on a permanent basis paving the way for income and employment generation for those people. In addition, he has motivated a good number of vegetable growers to for organic practice and formed the first 'organic farmers' club' in the district to earn sizeable income from this venture.

Paddy-wheat is the dominant cropping system of Rohtas district but the success of Sri Dilip Singh inspired the farmers of Rohtas as well as adjoining districts to go for vegetable cultivation either organically or inorganically to have higher income. Farmers who have adequate resources are approaching KVK regularly for imparting training on vegetable cultivation, particularly on organic vegetable production technique. The KVK is utilizing the expertise of Dilip Singh in providing training to other farmers and his field for practical demonstration of organic production procedure. The efforts of Sri Singh in self-development, initiating organic vegetable cultivation, developing variety of okra and promoting organic cultivation in the district has been rewarded by IIVR, Varanasi through 'Kisan Samman' award and appreciation of Bihar State Govt. as an acknowledgement to benevolent work.

Cooperative in water distribution proved successful

Successful running of cooperative societies is not very uncommon in agricultural sector. However, cooperative society for wah distribution is a little known concept. But, this innovative idea of Sri Sagar Bhagat has brought 'cultivation revolution' in Gumla district of Jharkhand.

Khastanga Nawatoli village of Ghaghra block in Gumla district is an average village of Jharkhand with agriculture as both primary and secondary livelihood option. About 300 odd population resides in the village (38 number of farm families) and almost every household has its own land holding bringing nearly 200 ha of cultivable area in the village. The villagers did not bother much about improved agricultural practices as Hindalco Company, located in the vicinity used to offer job of bauxite loading mainly to the male villagers. The earning both from farming and factory job was sufficient for the villagers to remain contended. The change, however, started taking place with the awareness of hazard of bauxite loading on the health of the villagers and efforts of Sri Sagar Bhagat towards better agriculture.

As a school teacher, Sri Bhagat was a known personality in the village and his involvement in farming in his 20.0 acre of land evoked excitement among fellow villagers a lot. The traditional cultivation practices of the village revolved around paddy (Gora Dhan), ragi, one or two pulses, a little bit fine quality rice and homestead vegetable cultivation. Discussion and observation by Sri Bhagat led to the conclusion that non-availability of irrigation water was the single-most inhibiting factor against improved agricultural practices. To his utter surprise he also observed that the village was surrounded by a natural perennial river which could very well solve the problem provided water lifting devices were installed. The possibility of lifting water from the perennial stream was thoroughly discussed with other villagers but considering the total cost of the project, the villagers lost interest. But Sri Bhagat was determined to make it a reality and contacted a number of GO and NGO for providing necessary support. In the year 2000, his tireless efforts bore fruits when PRADAN, a leading NGO working for the cause of agricultural development extended supporting hand to make arrangements for lifting water and distributing underground water through supply pipe.

Experts of PRADAN in consultation with Sri Bhagat and other villagers prepared a mega plan for distribution of irrigation pipe in such a way to bring every niche under irrigation. With the installation of two 10 H.P. lift pump wear the already constructed dam and spreading of 2500 meter underground pipe of 4 inch diameter at the depth of 2.5 to 3 ft to combat the elevation of dam, water could be successfully brought in the village in the year 2001. The supply of water was so abundant that it served the purpose of drinking and other household requirement also. The PRADAN continued its technical, financial and follow up activities like maintaining the machinery, creating provision for check point etc. for next two years and finally the responsibility was given to the villagers to run the system. Sustaining the system was proved to be a major hurdle on the part of the villagers and within no time the sign of mal-functioning of the system was visible. Again Sri Bhagat came in rescue and started persuading the villagers to maintain the system with the involvement of all and finally he succeeded in forming 'Kisan Jal Distribution

Cooperative Society' with delineated role and responsibility of very member. Once the cooperative started functioning, Sri Bhagat shifted his focus towards improved agricultural practices in his villages. He contacted Krishi Vigyan Kendra, Gumla, got himself trained in various aspect of crop cultivation and motivated other farmers to undergo training at KVK. He has developed his farm as a 'model farm' with the help and guidance of KVK for cultivation 'model farm' with the help and guidance of KVK for cultivation of crop and vegetables commercially throughout the year. The KVK has linked the village with NHM programme also for further prosperity. The entire village has turned into a centre for improved agricultural practices and the farmers of other villages are regularly visiting the farm of Sri Bhagat as well as other farmers' field ensuring rapid farmer to farmer extension. The water distribution society is successfully working for last 10 years and the concept is being replicated through MNREGA and MESO programme. An innovative idea of Sri Sagar Bhagat has brought all-round prosperity in Gumla district.

Piggery – a sustained livelihood option

Mr. Jaydhan Hansda, popularly known as 'pig seller' hails from a purely tribal village, Balijora under Morayam Panchayat, Shikaripara block of Gumla district, located in forest area nearly 13 km away from Dumka town of Jharkhand. His association with KVK Dumka in 2005 proved very beneficial in changing his economic condition within next few years.

Mr. Hansda with pigs

Feeding in group

One of the successful trainees of pig rearing practices offered by KVK, Sri Hansda was provided with a pair of piglet of T&D breed of two and half month old with the agreement returning a pair of piglet (one male and one female) to the KVK after first furrowing. Sri Hansda grabed the opportunity with utmost sincerity and reared the piglets with all sorts of care and as per advice of the KVK staff. Mr. Hansda, did not have any experience in pig rearing but used to maintain poultry birds and cultivate in his small farm. The earning was so meager that along with his wife had to work as daily-paid labourers in most of the times. The opportunity to rear pig came as a boon to him.

Starting with a pair of piglets, he increased the stock to 28 after returning two piglets to KVK and death of two piglets due to trampling…. He sold piglets and matured pigs at varied rate to the neighbouring farmers as well as gave to other farmers at 50% lease. The process continued for another three years and within next five years his earning was as high as Rs.2.5 lakh from selling of piglets, pig and giving on 50% lease. He, with the help of KVK contacted Kolkata market for sending pigs for meat purpose which fetched him more income. Slowly the villagers from heighbouring villages like Jhurko, Dhumna, Digalpaharia and others started approaching him for purchasing pig/piglets as well as learning pig rearing practices. The boar maintained as parental stock was used for upgradation of local sow of the village. Mr. Hansda has never allowed his pigs for free grazing and feed prepared with household material and grass, cabbage, cauliflower leaves are provided to the pigs. Besides regular cleaning the sty, the sow is given iron and multivitamin injection during pregnancy by Sri Handa of his own as per skill provided by KVK. Moreover, he prepares herbal vaccines for the piglets to maintain 0% mortality.

Preparing feed for pigs

Preparing herbal medicines for pigs

T&D breed of pig is available in other areas also but the farmers prefer to purchased pig/piglets from the farm of Mr. Hansda. Not a single farmers till date has reported any mortality in piglet purchased from Mr. Hansda. Additionally, they receive the advice of Mr. Hansda which he has gained over a period of 6 years in pig rearing. The benefit of piggery enterprise has not only improved his socio-economic condition of Mr. Hansda like purchase of land, construction of house, marriage of daughter, study of his son up to class X and others, but also made him a trusted institution in piggery. Presently he is having 100 pigs for disposal which will earn him at least four lakh rupees as per the present market rate. The initiative took by Sri Hansda has rapidly popularized rearing of T&D breed of pig in the entire district as well as in the neighbouring districts. Successful rearing of pig has indeed proved to be sustained livelihood option in Dumka district.

Tissue culture banana – a proven alternative

Banana as conventional fruit crop is cultivated under low land production system in Southern Andaman. Though a large number of farmers is engaged in cultivating this fruit crop, use of local varieties like Red Banana, Cheena, Mitha Champa, Khatta Champa etc. does not provide that much return to the farmers. The local varieties being tall, suffer from falling down during the month of October-November due to high wind velocity. This is accentuated by the infestation of 'bunching top' disease by which determinates the fruit quality. To protect banana trees from falling down, the farmers go for cost intensive practice of propping which further reduces the profit. Availability of disease free planting materials was a felt need for the farmers to sustain the cultivation of banana.

The situation was brought to the notice of KVK Port Blair by Sri Mukul Majumdar, a thirty one year old young farmer from Manpur village who also used to suffer from the same problem in banana cultivation. A team of KVK personnel visited village Manpur to assess the magnitude of the problem. The team also had detailed discussion with other farmers and suggested to replace the existing banana varieties with tissue-cultured variety. Not many farmers were convinced with the idea as they apprehended that it might not be accepted in the market. However, Sri Majumdar came forward and offered his 0.1 ha land for tissue cultured banana cultivation.

Bunch of banana in tissue cultured

Tissue culture raised banana sapling

The KVK before introducing the variety made sure that adequate number of disease free planting materials was available with them. Once the availability was ensured, the KVK guided Sri Majumdar in replacing the existing varieties with tissue cultured planting materials following the proper method of cultivation. The entire period of banana cultivation i.e. vegetative to reproductive stage was supervised by the KVK. Other banana farmers were also invited to observe the performance of newly introduced variety in the field of Sri Majumdar. Finally, the variety produced average yield of 30 kg/plant against 10 kg/plant harvested by the farmers from local varieties. Moreover, the shorter height of Tissue Cultured plants (2.5 m) saved the cost of propping followed by better management of disease and pest. From the second generation onwards, the return became much higher as he did not have to spend money for suckers, ration crop could be cultivated successfully from the previous plants. The taste of banana was also found very good and accepted by the

market at higher price. Sri Majumdar earned a net profit of Rs.25,000 which helped him repaying his bank loan as well as extending more area (1 bigha) under Tissue Cultured banana cultivation. For other farmers who were initially hesitant to try TC banana, the success of Sri Majumdar was an eye opener for them. He has been fully involved Tissue Cultured banana cultivation to bring prosperity in the life of his family members and other farmers are slowly but steadily following his footsteps.

Brackish water shrimp culture for economic upliftment

Sri Gopal Banik is one of those numerous ill-fated farmers who lost everything during Tsunami in 2004. The devastating calamity completely destroyed the fully matured paddy crop and left him with no other alternate but to seek shelter in Govt. camps alongwith all his family members. Sri Banik returned back to his native village, Lal Pahar, South Andaman after one year only to see his paddy field inundated with sea water making it unsuitable for crop cultivation. The problem was further aggravated with rainfall which turned the stagnant seawater into brackish water to bring crop cultivation into total halt. Sri Banik, who was an agricultural farmer in true sense lost all of his hope in regaining economic condition through agricultural practices. At that juncture, KVK Port Blair came into his rescue not through agricultural means but through diversification of profession.

In 2005-06, KVK as a part of survey work carried out on the behest of administration of A&N Islands to explore the feasibility of utilizing brackish water for fish cultivation came in contact with Gopal Banik. It was observed that the brackish water was very much suitable for fish cultivation, particularly for shrimp culture. However, the farmers who had little knowledge about shrimp culture did not subscribe the idea at all. Continuous interaction, discussion and realization of stark reality of difficulty in initiating crop husbandry in the inundated fields finally motivated Gopal Banik to give the new enterprise a try. The KVK organized special training programme on shrimp culture for Gopal Banik and other similar-minded farmers. As per the guidance of KVK, he constructed bund at 0.4 ha land and excavated the inundated field at 1.0 m depth for shrimp culture.

In September 2009, assistance in the farm of shrimp seed (PL-20), *P. monodon* in 10,000 numbers produced at Central Agricultural Research Institute was provided by KVK. Further, 40 number of Nicorock poultry birds alongwith feed were also made available through Frontline Demonstration programme to boost his morale as well as insurance against failure in shrimp culture. The prawn seed stocking was completed under the supervision of KVK in the converted pond of Sri Banik. Frequency of his visit to KVK increased with time and he opted for vegetable cultivation in one side of dyke of the pond. Initially he adopted semi-extensive system of prawn culture with application of little feed. The water quality was regularly monitored by KVK to ensure that shrimp culture got success. The anxiety of nearly four months was over when Gopal Banik harvested 95 kg of tiger prawn to

earn a profit of Rs. 28,500/- within a period of 105 days. The earning was so far the highest in his entire life of farming within such a small duration.

The success made him so confident that he started shrimp culture round the year followed by integration of agricultural and allied components to develop pond based farming systems. His innovativeness and hard work to turn destiny into his favour has been appreciated through conferring Best Farmer Award by CARI, Port Blair. The entire transformation has served as eye-opener for other farmers who have started adopting shrimp culture in their inundated fields to initiate a new beginning leaving behind the dreaded memory of Tsunami.

PREFACE

Farmer-to-farmer extension has emerged as one of the most potential tools for faster technology dissemination and enhanced rate of adoption. Successful practice of innovative/improved technologies is bound to inspire the entire farming community irrespective of village, district and state. There is no dearth of instances where the farmers have brought prosperity in the entire community through application of proper technology in the field of crop production, animal rearing, fish cultivation so on and so forth. In some cases, group approach has proved immensely beneficial over individual endeavour in changing the socio-economic profile of the people of that region. Such successful cases of adoption need to be highlighted more and more to infuse the sense of self-belief among other farmers for excelling in any walks of life. Krishi Vigyan Kendras operating under the ambit of the Zonal Project Directorate, Zone-II of Division of Agricultural Extension, Indian Council of Agricultural Research have come across many such successful practices of farmers, rural youths and farm-women which need to be landed to encourage others to follow the footprints of these successful people. As an appreciation to the courage, determination and dedication shown by the farmers to excel in life, Zonal Project Directorate, Zone-II has prepared forty such cases in the form of 'Success Story' to exhibit the potentiality of the farmers spread across the Union Territory of A&N Islands to the states of Bihar, Jharkhand and West Bengal in various fields of agriculture and agri-based enterprise. This compilation is intended to highlight that the farmers, rural youths and farm-women can overcome every odds of life to become successful citizen of this country.

Authors