FARM MECHANIZATION

Zero Tillage Benefited Multiple Ways

KVK Panipat, Haryana

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

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

Salient Features

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

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

Dr Azad Singh Dahiya
Programme Coordinator
Krishi Vigyan Kendra, Village Ujaha
Risalu P.O., District Panipat-132104

Email: azadsinghdahiya@hotmail.com
Ph: 0180-2001625
0180-2650830 (R), M : 09416101631

Zero Tillage – Boon For Rice - Wheat System

KVK Pratapgarh, Uttar Pradesh

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

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

Salient Features

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

Dr A.K. Srivastava
Programme Coordinator
Raja Dinesh Singh KVK
Avadheshpuram Campus
Lala Bajar P.O., Kalakankar, District Pratapgarh-229408
Email: rdskvk@gmail.com, akhilesh_kvkk@yahoo.co.in
Ph: 05341-240707
Fax: 05341-240707
M: 09415143774/09793731888

Zero Tillage Immensely Adopted by Wheat Growers

KVK Jamui, Bihar

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

Salient Features

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

Dr Raj Narain Singh
Programme Coordinator
Krishi Vigyan Kendra
Shrama Bharati, Khadigram
District Jamui-811313

Email: singrajnarain@yahoo.com
Ph: 06348-232239
Fax:06348-232239
M: 09934734126

Resource Conservation Interventions in Rice-wheat System

KVK Pratapgarh, Uttar Pradesh

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

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

Salient Features

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

Dr A.K. Srivastava
Programme Coordinator
Raja Dinesh Singh KVK
Avadheshpuram Campus, P.O. Lala Bajar, Kalakankar
District Pratapgarh-229408

Email: rdskvk@gmail.com
akhilesh_kvkk@yahoo.co.in
Ph: 05341-240707
Fax: 05341-240707
M: 09415143774/09793731888

Zero Tillage Assuresd Rabi Maize Production

KVK Karimnagar, Andhra Pradesh

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

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

Salient Features

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

Dr N. Venkateswara Rao
Programme Coordinator
Krishi Vigyan Kendra
Post: Jammikunta Jayaprakashnagar
District Karimnagar - 505122

Email: kvk_karimnagar@rediffmail.com
Ph: 08727-253550
Fax: 08727-254140
Ph: 08727-253473 (R), M: 09848573710

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

KVK Pithoragarh, Uttarakhand

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

Salient Features

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

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

Dr A.S. Jeena
Programme Coordinator
Krishi Vigyan Kendra, Gaina Aincholi P.O.
District Pithouragarh-262501

Email: kvkgainaaincholi@rediffmail.com
Ph: 05964-252175
05964-252175
M: 09412925737/09412106536

Rice Residues Managed through Happy Seeder

KVK Sangrur, Punjab

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

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

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

Salient Features

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

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

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

Farm Women Friendly Weeder

KVK Gadag, Karnataka

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

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

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

Salient Features

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

Dr L.G. Hiregoudar
Programme Coordinator
Krishi Vigyan Kendra, Hulkoti, District Gadag - 582 205

Email: kvkhulkoti@gmail.com
laxs1961@gmail.com
khpatil_kvk_hulkoti@yahoo.com
Ph: 08372-289606
Fax: 08372-289474
Ph: 08372-289772 (R), M: 09448358772

Aonla Orchards Saved Using Solar Energy

KVK Pali, Rajasthan

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

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

Salient Features

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

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

Dr Dheeraj Singh
Programme Coordinator
Krishi Vigyan Kendra, CAZRI
Jodhpur, District Pali-306401

Ph: 02932-256771
Fax: 02932-256098
M: 09414194005

Laser Land Leveler Enhanced Water Use Efficiency

KVK Sangrur, Punjab

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

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

Salient Features

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

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

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

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