Water Use Efficient Technologies for Improving Productivity and Sustainability of Sugarcane

(Final Report of Farmers' Participatory Action Research Programme, 2008-11)

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Indian Institute of Sugarcane Research
Lucknow- 226002, Uttar Pradesh, India
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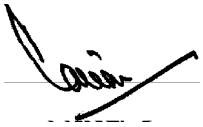
FOREWORD

In coming years, Indian agriculture will need more water to produce enough foodgrains to fulfill ever increasing requirement of growing population. On the other hand the actual availability of water will reduce and supply is projected at just half of the demand by the year 2030. This alarming scenario demand immediate interventions at farmers' fields to produce more foodgrain per drop of water. Sugarcane, an important cash crop of India, consumes considerable quantity of water than any other crops. Moreover, unscientific method of irrigation adopted by the farmers result into considerable loss of water. Indian Institute of Sugarcane Research, Lucknow devised irrigation water saving techniques in sugarcane like skip furrow irrigation, irrigation at critical growth stages, trash mulching and ring pit planting, which can enhance irrigation water use efficiency by 1.5 to 2.5 times. To exploit the potential of these water saving technologies, the Ministry of Water Resources, Govt. of India sponsored a Farmers' Participatory Action Research Programme (EPARP) to this institute for a period of three years (2008-2011).

The interdisciplinary team comprising Social Scientists, Agronomists, Soil Scientist, Water Conservation Engineer put their all efforts to transfer and popularise water saving sugarcane technologies among cane growers by implementing 100 demonstrations at farmers' fields in close collaboration with sugar mills. The results of demonstrations clearly indicate that the tangible benefits were accrued to the farmers in terms of irrigation water saving, enhanced income, increased knowledge & adoption. The fellow farmers of same villages and farmers from neighbouring villages got acquainted with the benefits of water saving technologies by visiting demonstration plots. This will serve as torch-bearer in spreading these technologies to larger areas.



(R.L. Yadav)
Director
IISR, Lucknow

PREFACE

Water is one of the most precious natural resource base supporting all kinds of life on this earth. It is critical input in food production for survival of human and animal life. Indian agriculture is producing enough food for 17% of the world population with only 2.3% of global land resources and 4% of available fresh water resources of the world. The per capita water availability in India decreased from 5300 m^3 in 1951 to 1653 m^3 in 2007, this trend is expected to reach as low as 1500 m^3 by 2025, owing to climate change, global warming and ever increasing population. By 2020, Indian agriculture will need 29% more water, however, the actual availability of water is likely to reduce by 12%. The increase in water demand will be governed by growing demand for enough rice, wheat and sugarcane to meet ever increasing requirement of growing population. On the other hand the water supply is projected at just half of the demand by 2030. Under such an alarming scenario, management of water resources is going to play pivotal role in agricultural production system. At present, more than 80% of the exploitable water resources in the country is consumed by different agricultural activities. Irrigation is major water consuming activity in agriculture, where water use efficiency seldom exceeds 35% with prevalent method of irrigation.

Sugarcane, an important cash crop of the country, requires considerable quantity of water during its entire crop cycle of 12-18 months, depending upon agro-climatic regions varying from sub tropical to tropical. The annual water requirement of this crop in sub tropical states like Uttar Pradesh, Punjab, Haryana and Bihar is 1400-1500 mm. Majority of sugarcane farmers in these states irrigate sugarcane unscientifically with only 35-45% irrigation efficiency, leading to great loss of irrigation water. Research institutions of NARS, WALMI, etc. carried research to increase efficiency of surface irrigation methods, but technologies developed could not find way to the farmers' fields due to lack of resources and technology transfer mechanism. In the past, many researchers reported higher water use efficiency in sugarcane with techniques like skip furrow method of irrigation, irrigation at critical growth stages, trash mulching and ring pit method of planting. Irrigation water use efficiency in sugarcane with these water saving technologies can be enhanced by 1.5 to 2.5 times.

The Ministry of Water Resources, Government of India has initiated Farmers' Participatory Action Research Programme (FPARP) with the mission 'more income

per drop of water'. In due recognition of water saving sugarcane technologies developed by IISR, The Ministry sponsored project entitled "Farmers' Participatory Action Research on Water Use Efficient Technologies for Improving Productivity and Sustainability of Sugarcane" to this Institute. Transfer and popularisation of these water saving sugarcane production technologies among sugarcane growers of Uttar Pradesh by implementing 100 demonstrations of one hectare each on farmers' fields was major objective of the project.

The project was implemented in 4 sugar mill zones of Sitapur and Barabanki districts of Uttar Pradesh. During 2008-2011, a total of 100 demonstrations (16 on ring pit method of planting, 32 on skip furrow method of irrigation, 24 on irrigation at critical growth stages and 28 on trash mulching in ratoon) were conducted. The quantum increase in irrigation water use efficiency and sugarcane yield recorded at farmers' fields are major achievements of the project. The increase in knowledge and adoption of water saving sugarcane technologies among the farmers is another feather to success of this project. At the same time accrued benefits due to enhanced yield, irrigation water saving and income increases satisfaction level of farmers with sugarcane cultivation.

The authors are indebted to the Ministry of Water Resources, Govt. of India, New Delhi for sponsoring the project. We express our heartfelt gratitude to all officials of Central Water Commission, New Delhi and Lucknow.

We express our sincere thanks to Dr. R.L. Yadav, Director, IISR for all his guidance, leadership and support throughout the project implementation period.

We are immensely grateful to the officers and cane development workers of Biswan Sugar Mill, Biswan; Kamlapur Sugar Mill, Kamlapur; Balrampur Chini Mills, Rauzagaon & Hydergarh for their generous help, support and logistics needed for smooth conduct of demonstrations in their mill zone areas.

Words cannot express our deep sense of gratitude to the sugarcane farmers for their whole-hearted participation in execution of the programme and also for their cosmopolite outlook of learning and interacting.

Editors
&
Project Personnel

EXECUTIVE SUMMARY

Water and land are the two most critical resources to achieve the desired production of food, fibre, feed and fuel to sustain the demand of growing population. India has to produce annually 380 million tonnes of foodgrains to provide food and nutrition security to 17% of the world population with 2.3 per cent of land and 4 per cent of available fresh water resources of the world. Owing to the climate change, global warming and regular increase in population, the per capita water availability, which was more than 5300 m^3 in 1951, has already dropped to 1653 m^3 in 2007. Further, it is likely to be less than 1500 m^3 by 2025 (less than the internationally prescribed safe level of 1700 m^3). Agriculture is the main concern for India as far as the management of water resources is concerned. It consumes more than 80 per cent of the exploitable water resources of the country. Majority of cropped area is irrigated with surface methods for which water use efficiency seldom exceeds 35 per cent. Declining availability of water for agriculture warrants for enhancing the water use efficiency and water productivity in agriculture.

Sugarcane is one of the important cash crops in India. It is grown in two distinct agro-climatic regions; tropical and sub-tropical. Over 45 million farmers are involved in sugarcane production and about 7.5 per cent rural population is directly or indirectly dependent on the sugar industry. During the last five years (2004-05 to 2008-09), sugarcane is being cultivated annually over an area of 4.50 million ha comprising 1.79 million ha in tropical and 2.71 million ha area in sub tropical regions of the country. Sugarcane requires considerable quantity of water. The annual water requirement for this crop is 1400-1500 mm in sub tropical region. Majority of the farmers irrigate sugarcane unscientifically and therefore, irrigation efficiency at farmers' fields seldom exceed 35-45 per cent. Scientists have worked to enhance irrigation efficiency by adopting advance irrigation methods or by modifying existing surface irrigation methods. The water saving technologies developed, could not find way to the farmers fields due to lack of resources and technology transfer mechanism. Considering the importance of conserving ever depleting and degrading water resources, Ministry of Water Resources, Government of India has initiated Farmers' Participatory Action Research Programme (FPARP). Indian Institute of Sugarcane Research, Lucknow has also developed several water saving production technologies for sugarcane cultivation. In recognition of these water saving production technologies, Ministry of Water Resources, Government of India has entrusted this institute to transfer and popularise these technologies among

sugarcane growers to increase factor productivity. In light of this, present project was initiated with the objectives: (a) To demonstrate water use efficient sugarcane production technologies, (b) To work out the economics of demonstrated technologies at farmers' fields, (c) To establish *Gyan Chaupals* and impart training for reinforcing as well as sustaining knowledge and (d) To measure the technological and socio-economic impact of technologies.

To implement the project, two districts; Barabanki and Sitapur were selected purposively as these were in the list of agriculturally backward districts of the country as declared by the Planning Commission. From each selected district two blocks thus, 4 blocks were selected by following stratified random sampling procedure. During the project period, 100 demonstrations (16 on Ring pit method of planting, 32 on Skip furrow method of Irrigation, 24 on Irrigation at critical growth stages and 28 on Trash mulching) were conducted. To assess the impact of demonstrations, the economic and socio-psychological variables were also studied.

The results of demonstrations revealed that there was significant increase in crop yield, irrigation water saving and irrigation water use efficiency over farmers' practice. The maximum increase in cane yield was recorded in ring pit method of planting (96.4%) over the conventional method followed by skip furrow method of irrigation (38.8%), irrigation at critical growth stages (28.2%) and trash mulching (25.7%).

The saving in irrigation water varied from 21.7 to 44.5 per cent. The increase in irrigation water use efficiency (IWUE) was recorded highest in ring pit method of planting (142.6%) over the conventional method followed by irrigation at critical growth stages (85.2%), trash mulching (72.4%) and skip furrow method of irrigation (68.9%).

The average germination of sugarcane planted during the project period (2008-11) under ring pit method of planting was 70.80 per cent. Similarly, the average germination of cane planted under skip furrow method of irrigation and irrigation at critical growth stages (ICGS) were 37.20 and 36.70 per cents, respectively, which were higher than the germination under farmers' practice (35.10%).

At the first order of tillering stage, number of average tillers per hectare in demonstrated technologiess namely, ring pit planting method, skip-furrow method of irrigation, ICGS and trash mulching were recorded at 90533, 95500, 91838 and 109633, respectively, as compared to 91333 under farmers' practice. However, in the second order of tillering highest average number of tillers per hectare (285400) were recorded under ring pit method of planting followed by trash mulching

(258333), skip furrow method of irrigation (223100), ICGS (212267) and farmers' practice (205367). In third order of tillering, the highest average population of 298467 tillers ha^{-1} was recorded with ring pit method of planting followed by ICGS (254667), skip furrow method of irrigation (245167) and trash mulching (244000).

At the time of grand growth period, the maximum average plant population was recorded with the ring pit method of planting (128367) followed by skip furrow method of irrigation (99167), ICGS (93833) and trash mulching (91233) as compared to the farmers' practice of 83500 plant ha^{-1}. The highest average number of millable cane (NMC) per hectare was recorded with ring pit planting method (122967) followed by skip furrow method of irrigation (93333), ICGS (89233) and trash mulching (87033) as compared to farmers' practice (77700).

Demonstrated water saving technologies enhanced income of the farmers. The benefit:cost (B:C) ratio under demonstrated technologies increased significantly. Highest increase in B:C ratio was observed in trash mulching technology and the lowest increase in ICGS. However, the B:C ratio under ring pit method of planting and skip furrow irrigation was statistically at par but significantly higher than that of farmers' practice.

After completion of demonstrations, it was observed that highest increase in soil organic carbon (OC %) was observed under trash mulching, followed by ring pit planting method. Under other demonstrated technologies, no significant change in soil organic carbon was observed. Regarding available N, P and K, no definite trend was observed.

Demonstrations conducted under FPARP on farmers' fields during the project period (2008-2011) resulted in considerable increase in knowledge level of farmers in general sugarcane cultivation practices as well as in water saving sugarcane technologies viz., ring pit method of planting, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching in ratoon. The knowledge score in general sugarcane cultivation before the start of FPARP was 49.56, which increased to 81.62 at the end of FPARP, recording 64.69% increase in knowledge level. At the same time, percentage increase in knowledge level of farmers in water saving technologies viz., ring pit, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching were 95.58, 85.78, 82.80 and 62.13 per cents, respectively. The cognitive domain of farmers were triggered by regular visit of scientists, interaction meeting with them, on farm discussion, distribution of literature etc. during implementation period of FPARP (2008-2011), as a result farmers increased their knowledge level.

Increase in knowledge level well supported by method & result demonstrations conducted at farmers' fields and critical input supplied/delivered to farmers under FPARP culminated into increase in adoption of sugarcane technologies by the farmers. The adoption level of farmer in general sugarcane cultivation was 38.61 (Pre-FPARP), which increased to 55.36 (Post-FPARP) recording an increase of 43.38 per cent. Likewise, the increase in adoption of water saving technologies viz., ring pit, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching were recorded to the extent of 81.18, 86.42, 84.81and 46.89 per cents, respectively. The considerable increase in adoption of water saving technologies clearly indicates farmers' satisfaction with performance of these technologies under their resource conditions.

Under FPARP, visiting scientists / officials organised group discussion with farmers to appraise them about facilities /provisions available with social organizations/ institutions/government departments and also made them aware to enhance their participation with these agencies in order to get benefited. As a result the participation of farmers in these social organization / institutions increased. The social participation of farmers increased from 16.35 to 21.61, recording an increase of 32.17 per cent.

Before the start of FPARP the mass media exposure of farmers was 16.35, which was recorded 21.61 at the end of FPARP, thus an increase of 32.17 per cent was recorded in mass media exposure. There are different extension functionaries/ agencies such as VLW, supervisor, BDO/CDO/ADO, sugar mill personnel, cane cooperative, KVKs, Research organization, etc. which extend or disseminate information related to cane cultivation, marketing, inputs, subsidies, advance methods etc. to the farmers. The farmers contact with these extension functionaries/ agencies increased from 15.60 to 22.34 with a percentage increase of 43.21 per cent. Effort under FPARP was also applied to assess that up to what extent cane growers were satisfied with sugarcane cultivation. Farmers obtained an average of 20.81 score against maximum obtainable score of 42 at the start of FPARP, which increased to 30.65. The increase in yield, water saving and income of farmers due to demonstrations of water saving technologies resulted into 47.28 per cent increase in farmers' satisfaction with cane cultivation.

The results of this project thus indicate that farmers of the areas where FPARP was implemented derived immense benefits in terms of knowledge enhancement, increased adoption, conserving water resource and higher income.

Introduction

India's population is likely to reach about 1.4 billion by 2025 AD with its current growth rate of about 1.9 per cent per annum. Such an increased population will further increase requirement for food, fibre, feed and fuel. To achieve the desired production of these needed items, land and water are the two most critical resources. Considering these resources, India has to produce annually 380 million tonnes of foodgrains to provide food and nutrition security to 17% of the world population on 2.3 per cent of land and with only 4 per cent of the available fresh water resources of the world. With increasing pressure of population, the per capita availability of arable land, which was 0.34 ha in 1950-51, is likely to shrink to 0.08 ha in 2025. Similarly, the per capita water availability, which was more than 5300 m^3 in 1951, has already dropped to1653 m^3 in 2007. Further it is likely to be less than 1500 m^3 by 2025 (less than the internationally prescribed level of 1700 m^3). Owing to the climate change, global warming and regular increase in population, it is decreasing every year and has already reached to water stress level (Fig.1). According to the modest estimates (Anon., 2006), water will become a scarce commodity during 2050 (Fig. 1). Simultaneously, the availability of water for agricultural use is decreasing due to diversion of irrigation water to other priority areas e.g. domestic, industries, energy etc. (Table1).

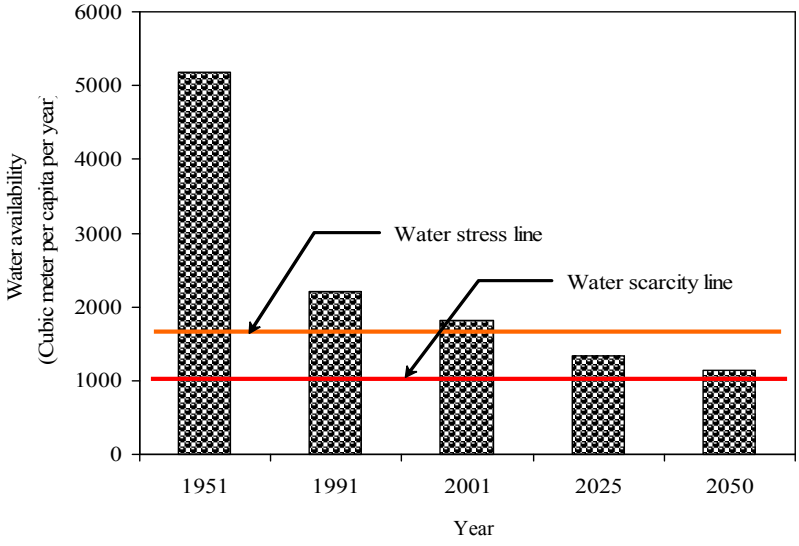


Fig.1. Per capita availability of fresh water in India (Source: Anon., 2006)

Table 1. Annual availability of fresh water (billion cubic metre)

User sector	Year		
	2000	2025	2050
Irrigation	541 (85.3)	910 (83.3)	1072 (74.1)
Domestic	42 (6.6)	73 (6.7)	102 (7.0)
Industries	8 (1.3)	22 (2.0)	63 (4.4)
Thermal power	2 (0.3)	15 (1.4)	130 (9.0)
Others	41 (6.5)	72 (6.6)	80 (5.5)
Total	634 (100)	1092 (100)	1447 (100)

*Figures in the parenthesis indicate per cent of total

Source: (Anon., 2006)

According to the latest report from a study on the global water scenario by International Consultancy McKinsey in collaboration with the world bank affiliate-International Finance Corporation, released on 23 November, 2009 in Washington and published in the Times of India, Lucknow edition on 24 November, 2009, the water demand in India will grow annually by 2.8 per cent to reach a whopping 1500 billion cubic meter (BCM) during 2030. This increase will be driven by domestic demand for rice, wheat and sugar for the growing population, and a growing demand for diet. On the other hand, the water supply is projected at only about 744 BCM that is just half the demand. Globally, the water consumption at present is 4500 BCM which is projected to be 6900 BCM during 2030. This will be 40 per cent more than the estimated reliable and sustainable water supply today. It is further predicted that 40 per cent of the world population will face chronic water shortage by 2025. Evidently, in future, more food, fibre, feed, fodder and fuel have to be produced with less and less water and declining land resources.

Agriculture is the main concern for India as far as the management of water resources is concerned. It consumes more than 80 per cent of the exploitable water resources of the country (Table 1). The water use efficiency seldom exceeds 35 per cent in prevelent irrigation methods. The water availability for agriculture is declining. Such an alarming situation warrants for enhancing the water use efficiency and water productivity in agriculture.

Sugarcane is one of the important cash crops in India. It is grown in two distinct agro-climatic regions: tropical and sub tropical (Fig. 2). Maharashtra, Karnataka, Gujarat and Tamil Nadu in tropical region, while Uttar Pradesh, Punjab, Haryana and Bihar in sub-tropical region are the important sugarcane growing states. Uttar

Pradesh in sub-tropical and Maharashtra in tropical region, however, occupy the top position as far as sugarcane crop area and sugar industry are concerned. Over 45 million farmers are involved in sugarcane production and about 7.5 per cent rural population is directly or indirectly dependent on the sugar industry. During the last five years (2004-05 to 2008-09), sugarcane is being cultivated annually over an area of 4.50 million ha comprising 1.79 million ha in tropical and 2.71 million ha area in subtropical regions of the country. During this period, the average sugarcane productivity remained 81.83 t ha^{-1} in tropics and 56.49 t ha^{-1} in subtropics with the national average of 66.38 t ha^{-1}. By the year 2020, India will need 27.29 million tonnes of sugar to meet the demand of the increasing population. To produce this much sugar, the country will require annually 415 million tonnes of sugarcane from an area of 4.15 million ha having 100 t ha^{-1}, the average productivity of cane with 11.00 per cent sugar recovery.

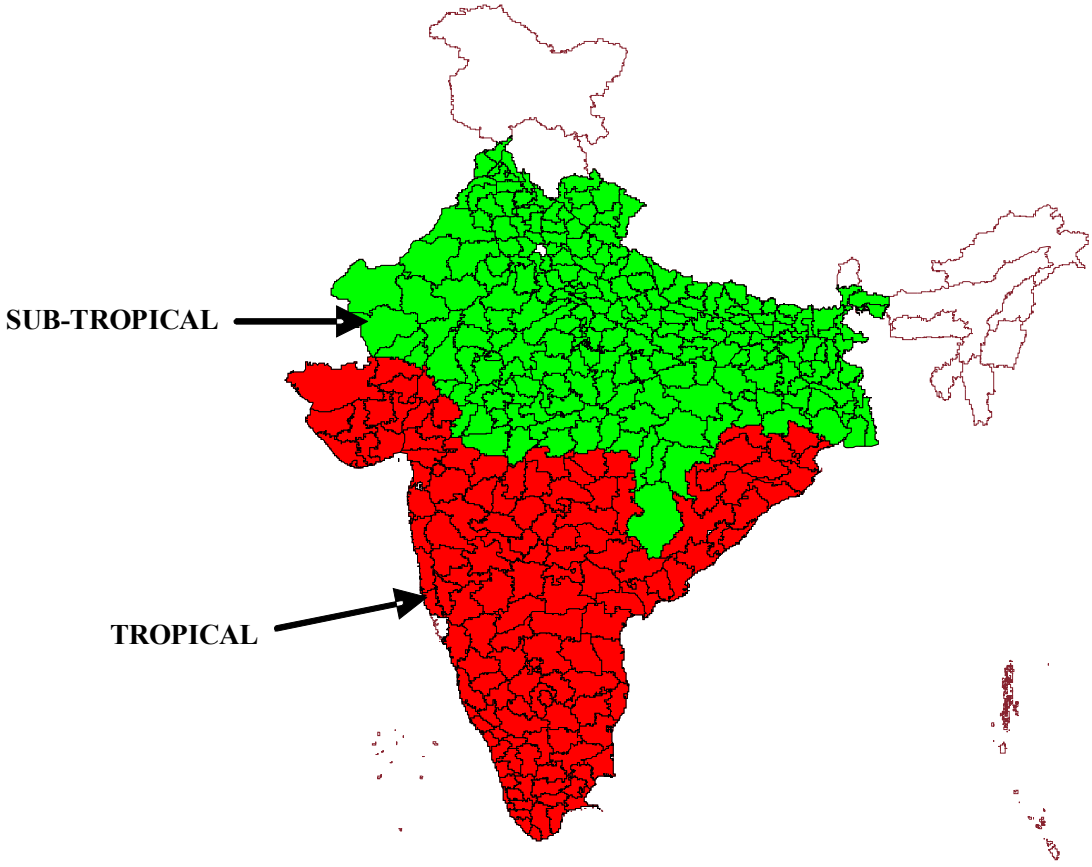


Fig. 2. Sugarcane growing zones in India

Farmers' Participatory Action Research on Water Use Efficient Sugarcane Technologies

Sugarcane requires considerable quantity of water. The annual water requirement for this crop is 1400-1500 mm in sub tropics. Majority of the farmers irrigate sugarcane unscientifically and therefore, irrigation efficiency at farmers fields seldom exceed 35-45 per cent.

Though, India is placed among the countries having highest irrigated area but the productivity of irrigated land in India is very low as compared to the other countries. In the country 95 per cent of the farmers are irrigating their crops with surface irrigation method with 30-40 per cent irrigation efficiency. To increase irrigation efficiency of surface irrigation methods, voluminous work has been carried out by the research institutions of National Agricultural Research System, WALMI, etc., but the water saving technologies developed by these institutions could not find way to the farmers fields due to lack of resources and technology transfer mechanism. Scientists have worked to enhance irrigation efficiency by adopting advance irrigation methods or by modifying existing surface irrigation methods. Prasad *et al.* (1987) found higher water use efficiency with skip furrow irrigation as compared to check basin irrigation method. The water use efficiency for plant crop obtained by them was 2.97 and 2.31 t ha^{-1}–cm with skip furrow and check basin irrigation methods, respectively. Singh, *et al.* (1994) reported higher water use efficiency with alternate furrow irrigation method. The observed irrigation water use efficiency with alternate furrow irrigation was 0.75 t ha^{-1}-cm, higher in comparison to check basin and every furrow irrigation method, where the irrigation water use efficiency was 0.47 and 0.68 t ha^{-1}-cm, respectively. Hapse, *et al.* (1991) observed highest water use efficiency (0.79 t ha^{-1}-cm) with sub surface drip irrigation as compared to 0.33 t ha^{-1}-cm with conventional furrow irrigation method. Parikh *et al.* (1992) observed highest irrigation water use efficiency of 2.42 t ha^{-1}-cm when irrigation was applied through drip method at 0.3 IW/CPE ratio, while with furrow irrigation methods, irrigation water use efficiency achieved was only 0.90 t ha^{-1}-cm. To increase effectiveness of irrigation by reducing evaporation loss of moisture, trash mulching had been advocated by many researchers. Yadav and Prasad (1988) observed highest sugarcane yield and irrigation water use efficiency when irrigations are applied at 25 per cent deplition of available soil moisture. Motiwale and Singh (1971) observed higher irrigation water use efficiency with trash mulching. They reported 3.7 t ha^{-1}-cm and 2.3 t ha^{-1}-cm irrigation water use efficiency in the fields which received trash mulch and no-mulch, respectively. Therefore if the crop is irrigated scientifically, irrigation water use efficiency of sugarcane crop can be enhanced by 1.5 to 2.5 times. Considering the importance of conserving ever depleting and degrading water resources, Ministry of Water Resources, Government of India has initiated Farmers' Participatory Action Research Programme (FPARP).

Under FPARP, 5000 demonstrations on water saving technologies were carried out all over the country. Through these participatory demonstrations, not only the water saving technologies are transferred but also on field technology refinement is being done with the participation of the farmers. As this programme is implemented involving farmers as well as scientists, the scientists with the participation of farmers resolve the difficulties faced by the farmers in adoption of the technologies. Indian Institute of Sugarcane Research, Lucknow has also developed several water saving production technologies for sugarcane cultivation. In recognition of these water saving production technologies, Ministry of Water Resources, Government of India has entrusted this institute to transfer and popularise water saving technologies among sugarcane growers to increase factor productivity. In light of this a project entitled "Farmers' participatory action research on water use efficient technologies for improving productivity and sustainability of sugarcane" was implemented with the following objectives:

Objectives

1. To demonstrate water use efficient sugarcane production technologies.
2. To work out the economics of demonstrated technologies at farmers' fields.
3. To establish *Gyan Chaupals* and impart training for reinforcing as well as sustaining knowledge.
4. To measure the technological and socio-economic impact of technologies.

Description of water use efficient production technologies

The technologies identified for higher water use efficiency and selected for demonstration at farmers' fields in participatory mode are described as follows :

1. **Ring pit method of planting :** The field is marked at a regular distance of 105 cm, leaving 65 cm space in the beginning, both length and width wise. Nearly, 9000 pits per ha of 75 cm diameter and 30 cm depth are made by pit digger. The soil dugged up from the pit is kept in the periphery of the ring in 30 cm space left in between the two pits. In every pit, 3 kg farmyard manure or compost or press mud cake is mixed uniformly before placing the setts for planting. In addition to this manure, 8 g urea, 20 g DAP, 16 g MoP and 2 g zinc sulphate are also added in each pit. Twenty, two budded setts are placed in each pit like spokes in a cycle wheel. The chlorpyriphos solution is applied on the setts and 2-5 cm soil cover is made over the setts. One irrigation just after planting and blind hoeing prompt germination. Thirty days after germination, 16 g urea is applied in each pit and half of the soil remaining at periphery is filled back in

the pit. In the month of April-May, the remaining soil is filled back in the pit and 16 g urea per pit is also applied. The filling of soil is completed when all the mother shoots have emerged. The crop under ring planting consists mainly of mother shoots, which are thicker and heavier than tillers. Ratoon yields are also higher because of deeper planting of plant crop. As the irrigation water is applied in the pits only, more than 40 per cent surface area remains dry. For this reason, with the ring planting 25-30 per cent irrigation water is saved. Higher sugarcane yield and reduced quantity of irrigation water results in 30-40 per cent higher irrigation water use efficiency.

2. **Skip furrow method of irrigation:** In this method of irrigation, instead of irrigating all the rows and inter-row spaces, one row is skipped and irrigation is given in alternate rows. With this technique, limited water may be used to irrigate larger area. In this method, sugarcane is planted in flat bed as usual and after germination, 45 cm wide and 15 cm deep furrows are made in alternate inter-row spaces. At the time of irrigation, the furrows thus made are irrigated. Irrigating sugarcane with this method results in 36.5 per cent water saving and 64 per cent increase in water use efficiency.
3. **Trash mulching:** Sugarcane trash is a waste material available after harvesting of the crop. Trash is spread @ 10 t ha^{-1} in the alternate inter-row spaces in ratoon crop at the time of its initiation. Because of trash mulching, effectiveness of irrigation is increased as the evaporation losses of moisture from soil surface reduced considerably. Sugarcane crop yield and water use efficiency increases by 26 and 40 per cents, respectively, due to trash mulch as the trash mulch keeps the soil moisture at a higher level for a longer time as compared to uncovered soil surface. Increase in sugarcane yield due to trash mulch is attributed to favourable moisture condition, increased microbial activities and addition of water-soluble nutrients from the trash. In the long run, soil organic carbon content is also improved.
4. **Irrigation at critical growth stages:** In the areas of limited water supply, ensuring irrigation at critical period of water need of the crop and deferring the same at somewhat less critical period, improves yield and irrigation water use efficiency. These critical stages for sugarcane are emergence, first order of tillering, second order of tillering and third order of tillering. Depending upon the availability of water, the crop is irrigated at these stages. If two irrigations are available, then the irrigations are provided at second and third order of tillering. If three irrigations are available, then the irrigations are provided at all three orders of tillering. If four irrigations are available, then the irrigations are provided at all the four critical stages.

Methodology

Study locale and sampling

Two districts; Barabanki and Sitapur were selected purposively as these were in the list of the backward districts of the country as declared by the Planning Commission. From each selected district two blocks thus, 4 blocks were selected by following stratified random sampling procedure. During the project period, 100 demonstrations (Table-2) were conducted.

Table 2: Year wise break up of demonstrations

Irrigation technology	Demonstrations Conducted			Total
	2008-09	2009-10	2010-11	
Ring pit method of planting	2	13	1	16
Skip furrow method of Irrigation	14	10	8	32
Irrigation at critical growth stages	9	7	8	24
Trash mulching	10	10	8	28
Total	35	40	25	100

Criteria for farmers' selection

- The farmer should have at least one ha area under sugarcane cultivation.
- He must be growing sugarcane from last 4-5 years.
- He should be ready to spare his land for conducting demonstration as well as agree to actively participate.

Gyan Chaupal

In each village one *Gyan Chaupal* was established. To establish *Gyan Chaupals* opinion leader (s) in each village was/were identified. These leaders and beneficiary farmers worked as the member of the *Chaupals*. However, other interested farmers were also participated. The participating scientists worked as the precursor and guide to initiate and run the *Gyan Chaupals.*

Training

In each selected village every year 4-5 trainings were conducted prior to every critical field operations.

Observations recorded

- Germination (%)
- Plant Population at different growth stages
- Tiller population at tillering phases
- Cane yield
- Water use
- Economics

Variables and their Measurement

To assess the impact of demonstrations, the economic and socio-psychological variables were selected under the study and methods for their measurements are mentioned in table 3.

Table 3: Indicators and methods for measuring impact

S. No.	Indicator	Observation	Tools/methods
1.	Knowledge	Pre & Post	Schedule
2.	Adoption	Pre & Post	Schedule
3.	Yield	Demonstration & Check	Weight of Harvested cane
4.	Water Saving	Demonstration & Check	Water meter
5.	Soil Health	Pre & Post	pH meter, E C Meter, Core Cutter, Infiltro meter and other prescribed standard procedure
6.	Income from sugarcane	Pre & Post	Schedule
7.	Social Participation	Pre & Post	Schedule
8.	Communication Behaviour	Pre & Post	Schedule
9.	Satisfaction with Sugarcane cultivation	Pre & Post	Schedule
10.	Benefit- cost ratio	Demonstration & Check	Estimation/calculation

Data Collection and analyses

On above mentioned parameters data were collected periodically by following standard procedures and techniques and analyzed with the help of suitable statistical tools.

Operational steps

Ring-pit planting method

- Leave 65 cm space around the boundary of the field.
- Then mark the field at 105 cm both length and width wise.
- At the cross section of these lines, dig pit of 75 cm diameter and 30 cm depth with pit digger machine. In case, the machine is not available the pits are dug manually. Keep the dug out soil in the vacant space.
- Cut the cane stalks in 2 budded setts and dip them in 0.2 per cent solution of bavistin (2 g Bavistin in one liter of water).
- In each pit, apply mixture of 3 kg FYM + 20 g DAP + 8 g urea + 16 g MoP + 2 g $ZnSO_4$ and mix it with soil.
- In each pit, put 20 two-budded setts in a similar pattern as of spokes in a cycle wheel.
- Spray the solution of 5 liters Chlorpyriphos 20 EC dissolved in 1500-1600 liters of water on setts for one ha area.
- Interconnect each pit with narrow channel manually for irrigating the pits.
- Now cover the setts with 2-5 cm of soil layer.
- Apply light irrigation just after planting.
- When soil moisture reaches in workable condition, break the soil crust.
- Do first filling of pits with dug out soil at 4^{th} leaf stage (35-40 days after planting in spring planting), apply light irrigation and topdress 16 g urea per pit when soil moisture reaches at workable condition.
- Carry out weeding as and when required.
- By third week of June, apply urea @ 16 g per pit and in the last week of June, apply Furadan 3 G @ 33 kg per ha. The gap of at least 3-4 days must be kept in application of urea and Furadan.
- Fill the pits with dug out soil completely by the last week of June.
- Carry earthing –up before onset of monsoon.
- Tie cane in each clump in the 1^{st} -2^{nd} week of August with lower dry leaves.
- In September, tie the clumps of opposite rows together.
- Remove lower dry leaves.
- Harvest the cane close to the ground level to take good ratoon crop.

Skip furrow method of irrigation

- Prepare the field well for planting sugarcane.
- Cut the cane stalks in 3 budded sett and dip them in 0.2 per cent solution of bavistin (2 g Bavistin in one liter of water).
- Open 12-15 cm deep furrows at 75 cm distance.
- Apply 60 kg Urea, 130 kg DAP and 100 kg MoP per ha as basal dose in furrows.
- Put treated setts in the furrows in bud-to-bud sett placement system.
- Spray the solution of 5 liters Chlorpyriphos 20 EC dissolved in 1500-1600 liters of water on the setts for one ha area.
- Plank the field to cover the furrows.
- After germination (35-40 days after planting), make 45 cm wide and 15 cm deep furrows in alternate row spaces.
- Irrigate the field through skip furrows.
- Top dress 110 kg urea per ha along the rows after the first irrigation (45-50 days after planting) and do hoeing.
- Carry out the hoeing as and when required.
- Irrigate the field 4-5 times at the interval of 25 days before onset of monsoon.
- By the last week of June, apply 110 kg urea per ha along the rows and after 3-4 days apply Furadan 3 G @ 33 kg per ha.
- Follow plant protection measures as per the need.
- Do earthing –up before onset of monsoon.
- Tie cane in each clump in the 1st -2nd week of August with lower dry leaves.
- In September, tie the clumps of opposite rows together.
- Remove lower dry leaves.
- Harvest the cane close to the ground level to take good ratoon crop.

Trash mulching

- Collect the trash.
- Shave the stubbles if needed.
- Irrigate the field just after collection of trash and stubble shaving.
- Do off barring/hoeing.
- Do gap filling if needed through germinated sett.
- Apply 140 kg urea, 130 kg DAP and 100 kg MoP per ha as basal dose along the cane rows.
- Apply trash in alternate rows.
- Apply second irrigation one month after ratoon initiation (at the first order of tillering).
- Top dress 100 kg urea.
- Carry out hoeing operations in alternate rows having no trash mulch.
- Apply third irrigation one month after second irrigation (at the second order of tillering).
- Do weeding and intercultural operations.
- Top dress remaining 100 kg urea during mid June.
- Do hoeing as and when required.
- Apply fourth irrigation one month after third irrigation (at the third order of tillering).
- Apply Furadan 3 G @ 33 kg per ha in the last week of June.
- Follow plant protection measures as per the need.

- Do earthing before onset of monsoon.
- Tie cane in each clump in the 1st -2nd week of August with lower dry leaves.
- In September, tie the clumps of opposite rows together.
- Remove lower dry leaves.
- Harvest the cane close to the ground level.

Irrigation at critical growth stages

- Prepare the field well for planting sugarcane.
- Cut the cane stalks in 3-budded sett and dip them in 0.2 per cent solution of bavistin (2 g Bavistin in one liter of water).
- Open furrows of 12-15 cm deep at 90 cm distance.
- Apply 60 kg urea, 130 kg DAP and 100 kg MoP per ha as basal dose in furrows.
- Put treated setts in the furrows in bud-to-bud sett placement system.
- Spray the solution of 5 liters Chlorpyriphos 20 EC dissolved in 1500-1600 liters of water on the setts for one ha area.
- Plank the field to cover the furrows.
- Irrigation

  A) Control: Irrigation practices followed by the farmers

  B) Treatment I

  i) Depth of irrigation water-7.5 cm

  ii) Time of irrigation – First irrigation after germination
  Second irrigation at first order of tillering
  Third irrigation at second order of tillering
  Fourth irrigation at third order of tillering

C) Treatment II

i) Depth of irrigation water-7.5 cm

ii) No of irrigations same as followed by the farmers

iii) Time of irrigation – If farmer applies:

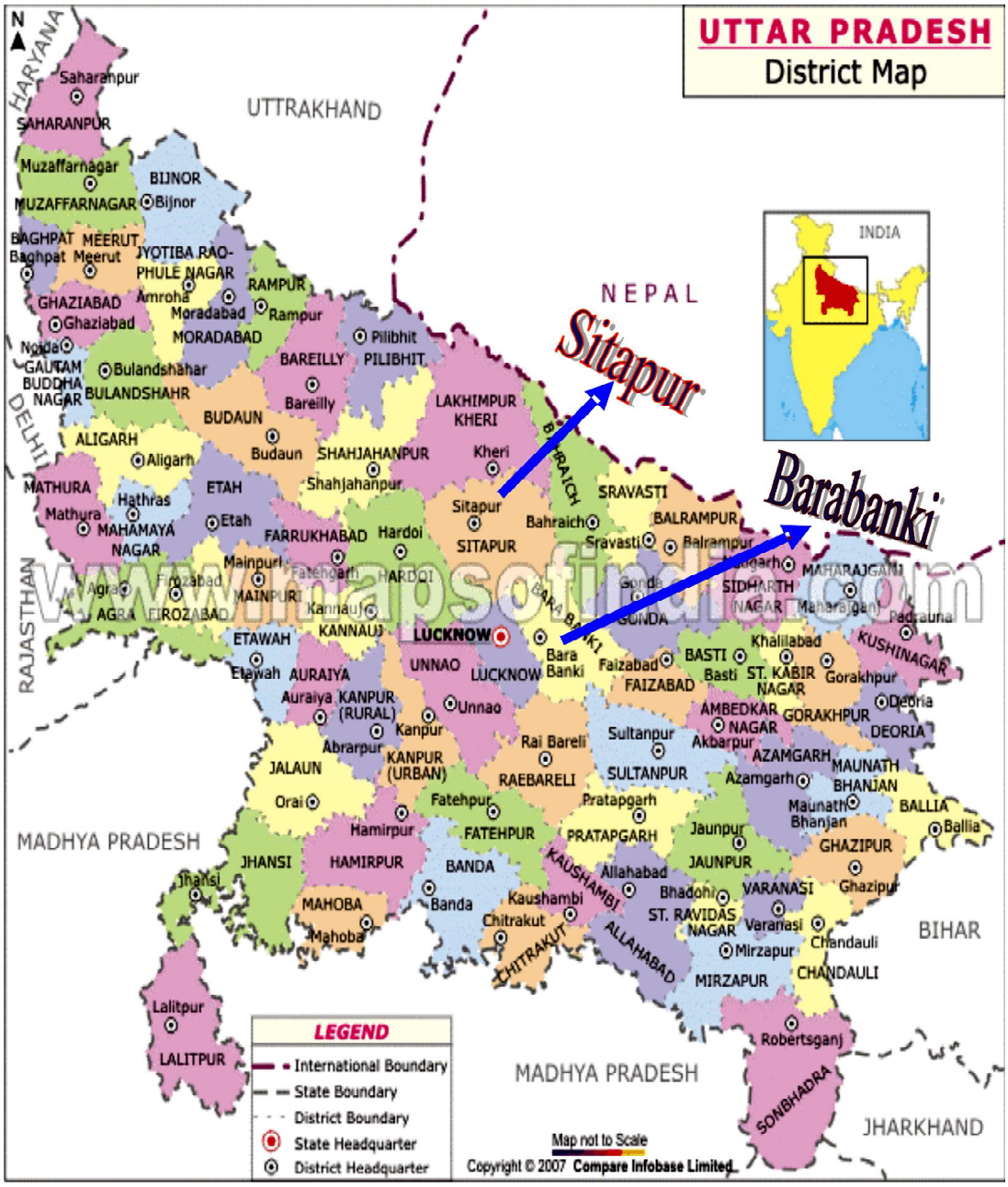
4 irrigations - after germination, 1st, 2nd and 3rd order of tillering

3 irrigations - 1st, 2nd and 3rd order of tillering

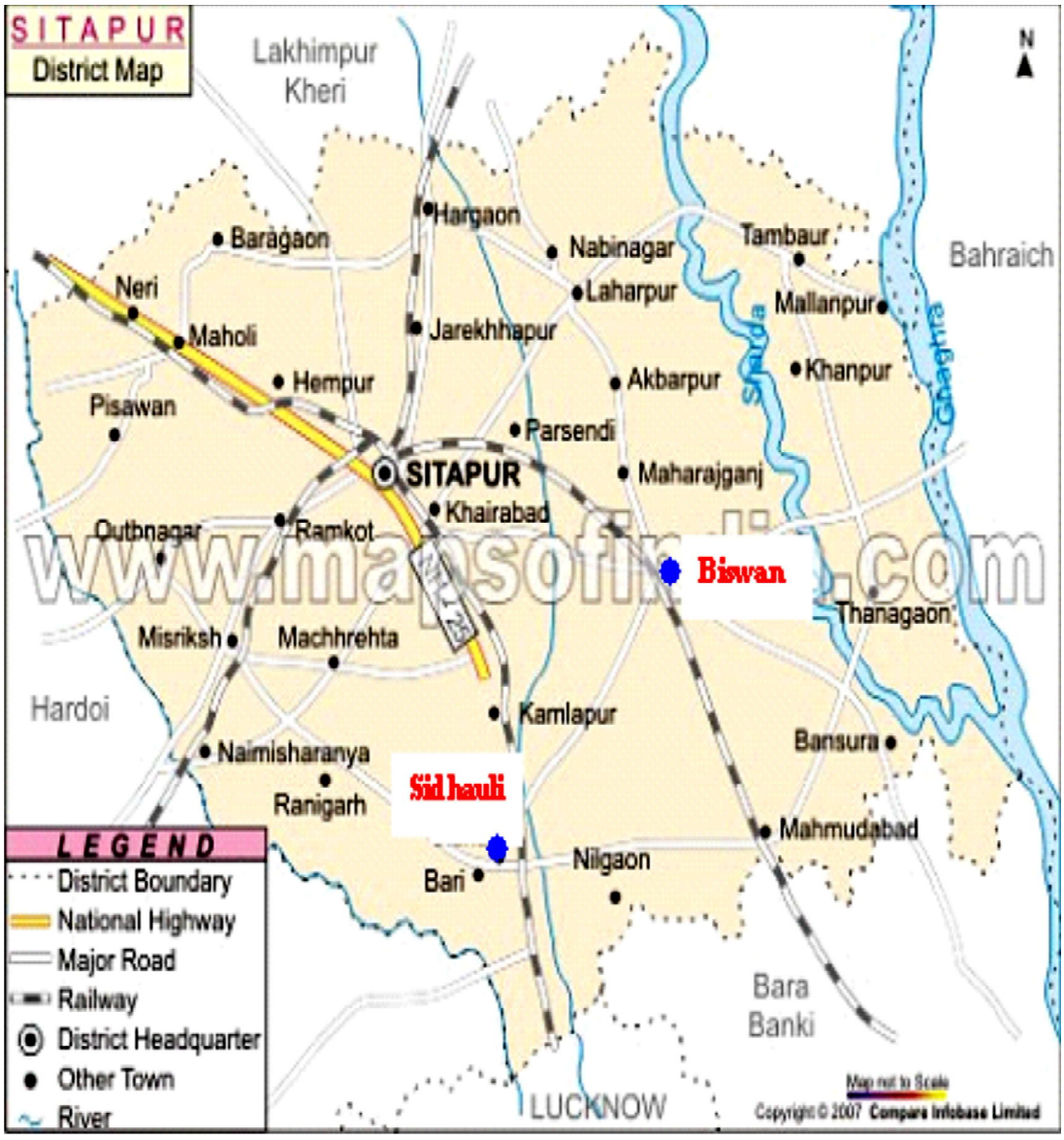
2 irrigations - 2nd and 3rd order of tillering

- Top dress 110 kg urea per ha along the rows after the first irrigation (45-50 days after planting) and do hoeing.
- Carry out hoeing as and when required.
- By the last week of June, apply 110 kg urea per ha along the rows and after 3-4 days, apply Furadan 3 G @ 33 kg per ha.
- Follow plant protection measures as per the need.
- Do earthing –up before onset of monsoon.
- Tie cane in each clump in the 1st -2nd week of August with lower dry leaves.
- In September, tie the clumps of opposite rows together.
- Remove lower dry leaves.
- Harvest the cane close to the ground level to take good ratoon crop.

Project Area Under FPARP

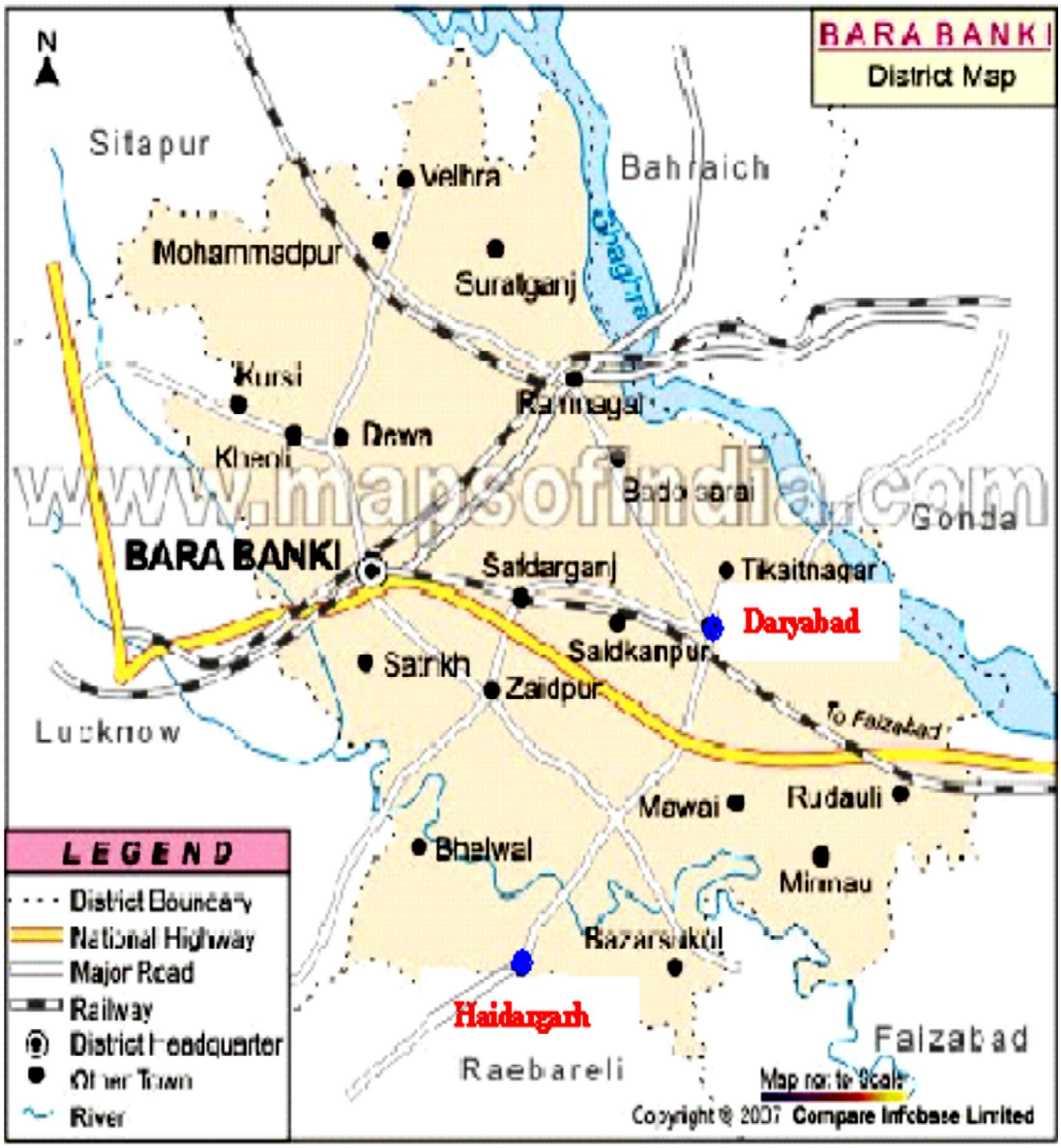


Map 1 : Selected districts under the project



- **Selected Blocks**

Map 2 : Blocks selected in Sitapur district



- **Selected Blocks**

Map 3 : Blocks selected in Barabanki district

Results

Effect of demonstrated technologies on yield, irrigation water saving and irrigation water use efficiency in sugarcane

Total 100 demonstrations (Tables 2, 4) on the fields of cane growers in the sugar mill Zones of Biswan, Rauzagaon and Hydergarh were conducted during 2008-09, 2009-10 and 2010-11 crop seasons. The results of demonstrations revealed that there was a significant increase in crop yield, irrigation water saving and irrigation water use efficiency (Table 4). The maximum increase in cane yield was recorded in ring pit method of planting (96.4%) over the conventional method followed by skip furrow method of irrigation (38.8%), irrigation at critical growth stages (28.2%) and trash mulching (25.7%). The saving in irrigation water varied from 21.7 to 44.5 per cent. The increase in irrigation water use efficiency (IWUE) was recorded highest in ring-pit method of planting (142.6%) over the conventional method followed by irrigation at critical growth stages (85.2%), trash mulching (72.4%) and skip furrow method of irrigation (68.9%),

Table 4. Effect of demonstrated technologies on yield, saving in irrigation water and irrigation water use efficiency in sugarcane

S. No.	Techno-logy	No. of demonst-rations	Average yield (t ha^{-1})		Increase in cane yield (%)	Irrigation water applied (ha-cm)		Saving in irriga-tion water (%)	IWUE (kg cane ha-cm^{-1})		% Incr-ease in IWUE
			Demonst-ration	Convent-ional		Demonst-ration	Convent-ional		Demonst-ration	Convent-ional	
1	Skip-furrow method of irrigation	32	88.54	63.80	38.8	53.72	65.37	21.7	1648.21	975.96	68.9
2	Ring-pit method of planting	16	125.28	63.80	96.4	52.92	65.37	23.5	2367.46	975.96	142.6
3	Trash mulching	28	80.18	63.80	25.7	47.66	65.37	37.2	1682.21	975.96	72.4
4	ICGS	24	81.76	63.80	28.2	45.25	65.37	44.5	1807.05	975.96	85.2

ICGS- Irrigation at critical growth stages, IWUE – Irrigation water use efficiency

Growth performance of sugarcane in demonstration plots

Germination: The average germination of crop planted during the project period (2008-11) in 16 demonstration plots under ring-pit method of planting was recorded at 70.80 per cent (Table 5). Similarly the average germination of cane planted under skip-furrow method of irrigation and irrigation at critical growth stages (ICGS) were 37.20 and 36.70 per cent, respectively. Which were higher than the germination under farmers' practice (35.10%).

Table 5: Average germination in demonstrations and under farmers' practice

Technology	Germination (%)			
	2008-9	2009-10	2010-11	Average
Ring pit method of planting	72.8	64.3	75.4	70.8
Skip furrow method of irrigation	37.5	33.8	40.3	37.2
ICGS	39.8	36.2	34.1	36.7
Farmers' Practice	33.6	34.5	37.2	35.1
$SE_m\pm$	2.2			
CD (0.05)	7.0			

ICGS- Irrigation at critical growth stages

Tiller population at various stages: As evident from the results presented in the table 6, at the first order of tillering stage, average number of tillers per hectare in demonstrated plots under ring pit planting method, skip furrow method of irrigation, ICGS and trash mulching were recorded at 90533, 95500, 91838 and 109633, respectively, as compared to 91333 under farmers' practice. However, in the second order of tillering under ring-pit method of planting, highest average number of tillers per hectare (285400) was recorded (Table 7) followed by trash mulching

Table 6: Average Tiller population at first order of tillering in demonstrations and under farmers' practice

Technology	Tiller population at first order of tillering (per ha)			
	2008-9	2009-10	2010-11	Average
Ring pit method of planting	87500	94000	90100	90533
Skip furrow method of irrigation	95000	94100	97400	95500
ICGS	94500	93400	87600	91833
Trash mulching	105300	114900	108700	109633
Farmers' practice	91000	93500	89500	91333
$SE_m\pm$	1917			
CD (0.05)	6046			

(258333), skip furrow method of irrigation (223100) and ICGS (212267), as compared to the farmers' practice (205367). As evident from table 8, in third order of tillering the highest average plant population of 298467 tillers ha^{-1} was recorded with ring pit method of planting followed by ICGS (254667), skip furrow method of irrigation (245167) and trash mulching (244000).

Table 7: Average tiller population at second order of tillering in demonstrations and under farmers' practice

Technology	Tiller population at second order of tillering (per ha)			
	2008-9	2009-10	2010-11	Average
Ring pit method of planting	273500	294200	288500	285400
Skip furrow method of irrigation	228400	225800	215100	223100
ICGS	218000	213500	205300	212267
Trash mulching	239000	278000	258000	258333
Farmers' practice	205500	209200	201400	205367
$SE_m\pm$	6330			
CD (0.05)	19963			

Table 8: Average tiller population at third order of tillering in demonstrations and under farmers' practice

Technology	Tiller population at third order of tillering (per ha)			
	2008-9	2009-10	2010-11	Average
Ring pit method of planting	291600	308500	295300	298467
Skip furrow method of irrigation	252000	248500	235000	245167
ICGS	256000	263000	245000	254667
Trash mulching	232000	264000	236000	244000
Farmers' practice	213500	213600	211800	212967
$SE_m\pm$	6038			
CD (0.05)	19042			

Plant Population

Results presented in table 9 show that at the time of grand growth period the maximum average plant population was recorded with the ring pit method of planting (128367) followed by skip furrow method of irrigation (99167), ICGS (93833) and trash mulching (91233) as compared to the farmers practice of 83500 plant ha^{-1}. As evident from table 10 the highest average number of millable cane (NMC) that is 122967 ha^{-1} was recorded with ring pit planting method followed by skip furrow method of irrigation (93333), ICGS (89233) and trash mulching (87033) as compared to farmers' practice (77700).

Table 9: Average plant population at the end of grand growth stage in demonstrations and under farmers' practice

Technology	Plant population at the end of grand growth stage (per ha) (October)			
	2008-9	2009-10	2010-11	Average
Ring pit method of planting	115000	145500	124600	128367
Skip furrow method of irrigation	94000	92000	111500	99167
ICGS	97500	99400	84600	93833
Trash mulching	87600	96800	89300	91233
Farmers' practice	78700	82500	89300	83500
$SE_m\pm$	5633			
CD (0.05)	17764			

Table 10: Average Plant Population at harvest in demonstrations and under farmers' practice

Technology	Plant population at harvest (number per ha)			
	2008-9	2009-10	2010-11	Average
Ring pit method of planting	105000	143500	120400	122967
Skip furrow method of irrigation	87500	86900	105600	93333
ICGS	92000	95500	80200	89233
Trash mulching	85000	92100	84000	87033
Farmers' practice	73500	79400	80200	77700
$SE_m\pm$	6248			
CD (0.05)	19705			

Sugarcane yield

Sugarcane yield recorded under different demonstrated technologies (*viz.*, ring pit method of planting, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching) and under farmers' practice during all the three cropping seasons (2008-09, 2009-10 and 2010-11) are presented in table 11. Data reveals that yield of sugarcane was higher under demonstrated technologies as compared to that of under farmers' practice. Ring pit system of planting and skip furrow method of irrigation yielded significantly higher as compared to the farmers' practice and other demonstrated technologies. Although sugarcane yield under ICGS and trash mulching technologies increased by 28.2% and 25.7%, respectively, but it was not statistically significant.

Table 11 : Year-wise Yield (t ha^{-1})

Technology	2008-9	2009-10	2010-11	Average
Ring pit method of planting	98.50	147.33	130.00	125.28
Skip furrow method of irrigation	86.69	85.43	93.50	88.54
ICGS	83.78	88.33	73.17	81.76
Trash mulching	75.92	88.30	76.33	80.18
Farmers' practice	63.06	67.18	61.17	63.80
$SE_m\pm$	7.08			
CD (0.05)	22.32			

Irrigation water use efficiency (IWUE)

Demonstrated irrigation water saving technologies improved irrigation water use efficiency (IWUE) significantly over farmers' practice (table 12). The increase in IWUE under ring pit system of planting was the highest followed by irrigation at critical growth stages, trash mulching and skip furrow irrigation. Ring pit system of planting improved irrigation water was efficiency by 142.6%, however, with skip furrow irrigation the increase in IWUE was 68.9%.

Table 12: Year-wise IWUE (kg ha^{-1} cm^{-1})

Technology	2008-9	2009-10	2010-11	Average
Ring pit method of planting	2614.29	2630.95	1857.14	2367.46
Skip furrow method of irrigation	1829.73	1451.58	1663.33	1648.21
ICGS	1812.78	2046.67	1561.71	1807.05
Trash mulching	1805.83	1766.00	1474.81	1682.21
Farmers' practice	1109.50	955.64	862.75	975.96
$SE_m\pm$	150.18			
CD (0.05)	473.63			

Benefit: Cost Ratio

Demonstrated water saving technologies resulted in enhanced benefits to the farmers. The benefit:cost ratio (B:C) under demonstrated technologies improved significantly. Highest improvement in B:C ratio was observed in trash mulching and the lowest improvement in ICGS. However, the improvement in B:C ratio under ring pit system of planting and skip furrow irrigation was statistically at par but significantly higher than that of farmers' practice (Table 13).

Table 13: Year-wise Benefit:Cost Ratio

Technology	2008-9	2009-10	2010-11	Average
Ring pit method of planting	1.85	2.03	1.52	1.80
Skip furrow method of irrigation	2.04	1.96	1.86	1.95
ICGS	1.91	1.45	1.30	1.55
Trash mulching	2.28	2.83	2.08	2.40
Farmers' practice	1.53	1.29	0.91	1.24
$SE_m\pm$	0.17			
CD (0.05)	0.53			

Effect of demonstrated technologies on soil health

After completion of demonstrations it was observed that highest increase in soil organic carbon (OC %) was observed under trash mulching, followed by ring pit planting method. Under other demonstrated technologies, no significant change in soil organic carbon was observed. Regarding available N, P and K no definite trend was observed (Table 14).

Table 14: Effect of demonstrated technologies on soil health

Technology	OC (%)		N (kg ha^{-1})		P (kg ha^{-1})		K (kg ha^{-1})	
	Before planting	After harvesting	Before planting	After harvesting	Before planting	After harvesting	Before planting	After harvesting
Ring pit method of planting	0.42	0.47	203.7	204.7	18.2	17.8	219.9	215.7
Skip furrow method of irrigation	0.43	0.44	213.7	196.1	19.0	19.3	225.5	224.6
ICGS	0.44	0.45	216.3	217.9	19.4	18.8	225.1	227.8
Trash mulching	0.42	0.48	209.9	198.9	20.1	19.5	225.5	234.9
Average	0.43	0.46	210.9	204.4	19.2	18.9	224.0	225.8
Farmers' practice	0.41	0.43	200.2	194.1	19.7	16.8	223.5	217.8

Effect of demonstrations on knowledge and adoption level of beneficiary farmers

As evident from Table 15, the demonstrations conducted under FPARP on farmers' fields duning the project period 2008-2011, resulted in considerable increase in knowledge level of farmers in general sugarcane cultivation practices as well as

in water saving technologies in sugarcane cultivation *viz.*, ring pit method of planting, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching in ratoon. The knowledge score in general sugarcane cultivation before the start of FPARP was 49.56, which increased to 81.62 at the end of FPARP, recording 64.69% increase in knowledge level. At the same time, percentage increase in knowledge level of farmers in water saving technologies *viz.*, ring pit, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching were 95.58, 85.78, 82.80 and 62.13 percents, respectively. The cognitive domain of farmers were triggered by *Gyan Chaupal* established, training imparted, regular visit of scientists, interaction meeting with them, on farm discussion, distribution of literature etc., during implementation period of FPARP (2008-2011), as a result farmers increased their knowledge level.

Increased in knowledge level, well supported by method & result demonstrations conducted at farmers' fields and critical input supplied/delivered to farmers under FPARP culminated into increase in adoption of sugarcane technologies by the farmers. The adoption level of farmers in general sugarcane cultivation was 38.61 (Pre-FPARP), which increased to 55.36 (Post-FPARP) recording an increase of 43.38 percent. Likewise, the increase in adoption of water saving technologies *viz.*, ring pit, skip furrow method of irrigation, irrigation at critical growth stages and trash mulching were recorded to the extent of 81.18, 86.42, 84.81and 46.89 per cents, respectively. The considerable increase in adoption of water saving technologies clearly indicate farmers' satisfaction with performance of these technologies under their resource conditions (Table 15).

Table 15: Effect of demonstrations on knowledge and adoption

Particulars	Knowledge score			Adoption score		
	Pre-FPARP	Post-FPARP	% increase	Pre-FPARP	Post-FPARP	% increase
General sugarcane cultivation	49.56	81.62	64.69	38.61	55.36	43.38
Ring pit method of planting	13.65	26.52	95.58	9.51	17.23	81.18
Skip furrow method of irrigation	8.30	15.42	85.78	5.23	9.75	86.42
ICGS	7.56	13.82	82.80	5.20	9.61	84.81
Trash mulching	13.23	21.45	62.13	11.75	17.26	46.89

Effect of demonstrations on social participation, communication behavior and farmers' satisfaction

The social organizations/institutions like *panchayat*, cooperative society, self help group, bank, farmers discussion group, religious committees, farmers' federation/union, political organization, etc. plays important role in extending social, economic and political benefits to the farmers for enhancing their farm income. Under FPARP, visiting scientists/officials organised group discussion with farmers to appraise them about facilities/provisions available with above mentioned social organizations/institutions and also made them aware to enhance their participation with these agencies in order to get benefited. As a result, the participation of farmers in these social organization/institutions increased. Table 16 clearly indicates that social participation of farmers increased from 16.35 to 21.61, recording an increase of 32.17 per cent.

Table 16: Effect of demonstrations on social participation, communication behaviour and satisfaction

Variable	Pre-FPARP	Post-FPARP	% increase
Social participation	16.35	21.61	32.17
Communication Behaviour			
1. Mass media exposure	11.56	16.45	42.30
2. Extension contact	15.60	22.34	43.21
Satisfaction with cane cultivation	20.81	30.65	47.28

The communication behavior of farmers is an important socio-psychological profile, decide farmers response to different electronic and print media (mass media)

in receiving and utilizing farm information disseminated by mass media. Before the start of FPARP the mass media exposure of farmers was 11.56, which was recorded 16.45 at the end of FPARP, thus an increase of 42.30 per cent was recorded in mass media exposure (Table 16). This make farmers more cosmopolite in nature as regard to getting information from different channels of mass media. This will help farmers in advancing sugarcane farming and increasing their income. There are different extension functionaries/agencies such as VLW, supervisor, BDO/CDO/ADO, sugar mill personnel, cane cooperative, KVKs, Research organization, etc. which extend or disseminate information related to cane cultivation, marketing, inputs, subsidies, advance methods etc. to the farmers. As evident from Table 16, the farmers' contact with these extension functionaries/agencies increased from 15.60 to 22.34 with a percentage increase of 43.21.

Effort under FPARP was also applied to assess that up to what extent cane growers were satisfied with sugarcane cultivation. Farmers obtained an average of 20.81 score against maximum obtainable score of 42 at the start of FPARP, which increased to 30.65 (Table 16). The increase in yield, water saving and income of farmers due to demonstrations of water saving technologies resulted into 47.28 percent increase in farmers' satisfaction with cane cultivation (Table 16).

Farmers' feedback

Farmers' feedback towards demonstrated water saving technologies

1. Ring pit method of planting

- Farmers reported that the germination is more in ring pit system in comparison to conventional planting method.
- They experienced a saving of 35-40 per cent in irrigation water.
- This system requires more labour.
- Farmers realized that they obtained 1.5-2.0 times more yield under this system in comparison to conventional method of planting.
- This system prevents lodging of sugarcane due to deeper planting.
- Farmers felt difficulty in intercultural operations.
- Seed requirement is higher.
- Digging of pits manually is time consuming. Pit-digger is not easily available and is costly.
- Multiple ratooning with good yield is possible.

2. Skip furrow method of irrigation

- Sugarcane crop can be irrigated with 35-40 per cent less water and also requires less time, energy and labour.
- Cane girth, height and weight are either at par or slightly increased in comparison to conventional irrigation system.
- Weed infestation is less.
- Farmers experienced less lodging of cane.
- After 2-3 irrigations, furrows were slightly filled with soil and needed reshaping.
- Farmers experienced difficulty in hoeing because during hoeing some amount of soil goes in the furrows.

3. Irrigation at critical growth stages

- Farmers realized that they could achieve normal cane yield by applying four irrigations only instead of five irrigations applied normally.
- Cane lodging is less.
- Weed infestation is also less.

4. Trash mulching

- Farmers experienced a saving of irrigation water to a tune of 30-35 per cent.
- Weed emergence is checked where trash is placed.
- Cost of production is reduced as hoeing is not done in the mulched area of field as well as irrigation time is reduced.
- Farmers harvested the same tonnage by providing three irrigations as compared to five irrigations normally provided while field is not mulched with trash.
- Farmers observed good bud sprouting when ratoon is initiated during winter months.
- Farmers reported problems of snakes in mulched fields.

Publications/presentations from the project

Yadav, D. V., Verma. R. P., Prasad, K., Sah, A. K., Gupta, R. and Singh, K. P., 2009. Performance of water use efficient sugarcane technologies under farmers' participatory action research programme. Pub. In the procceding of the Workshop on *Surface Water Resource Development & Management* on 17.03. 2009 organised by Ministry of Water Resources, CWC and Upper Ganga Basin Organisation at Lucknow, Pp. 100-112.

Yadav, D. V., Verma. R. P., K., Prasad, Sah, A., K., Gupta, R. and Singh, K. P., 2009. Participatory action research for irrigation water management in sugarcane cultivation. Pub. In the procceding of the Conference on *Food and environmental security through resource conservation in central India: Challenges and Opportunities (FESCO-2009),* organised by Indian Association of Soil and Water conservationists, at Agra, 16-18 September, 2009, p. 18.

Yadav, D. V., Verma. R. P., Sah, A. K., Prasad, K., Gupta, R. and Singh, K. P., 2009. Enhancing irrigation water use efficiency in sugarcane cultivation at farmers' field: An action research. Pub. In the procceding of the 5th Asian Regional Conference on *Improvement in Efficiency of irrigation projects through technology upgradation and better operation & maintenance,* organised by Ministry of Water Resources, Govt. of India at New Delhi, 6-11 December, 2009, p. 152.

Educational material developed

Extension Brochures

1. Ring Pit method of sugarcane planting for saving irrigation water. Prepared by- D. V. Yadav, R.P. Verma, Kasmta Prasad, A. K. Sah, Rajendra Gupta and K. P. Singh.
2. Irrigation Scheduling at Critical Growth Stages of sugarcane to save water. Prepared by- D. V. Yadav, R.P. Verma, Kasmta Prasad, A. K. Sah, Rajendra Gupta and K. P. Singh.
3. Skip-furrow method of irrigation for saving water in sugarcane. Prepared by- D. V. Yadav, R.P. Verma, Kasmta Prasad, A. K. Sah, Rajendra Gupta and K. P. Singh.
4. Trash mulching for saving irrigation water in sugarcane ratoon. Prepared by- D. V. Yadav, R.P. Verma, Kasmta Prasad, A. K. Sah, Rajendra Gupta and K. P. Singh.

प्रसार साहित्य

1. गड्ढ़ा बुवाई विधि अपनाकर सिंचाई जल की बचत करें। प्रस्तुति–डी. वी. यादव, आर. पी. वर्मा, कामता प्रसाद, ए. के. साह, राजेन्द्र गुप्ता, एवं के. पी. सिंह।
2. गन्ने की क्रान्तिक वृद्धि अवस्थाओं पर सिंचाई कर पानी बचाएँ। प्रस्तुति–डी. वी. यादव, आर. पी. वर्मा, कामता प्रसाद, ए. के. साह, राजेन्द्र गुप्ता, एवं के. पी. सिंह।
3. एकान्तर नाली सिंचाई विधि अपनाकर गन्ने में पानी बचाएँ। प्रस्तुति–डी. वी. यादव, आर. पी. वर्मा, कामता प्रसाद, ए. के. साह, राजेन्द्र गुप्ता, एवं के. पी. सिंह।
4. गन्ने की पेड़ी में पताई बिछाने से सिंचाई जल की बचत करें। प्रस्तुति–डी. वी. यादव, आर. पी. वर्मा, कामता प्रसाद, ए. के. साह, राजेन्द्र गुप्ता, एवं के. पी. सिंह।

Documentay films developed

1. Water saving Technologies in Sugarcane
2. सिंचाई जल बचत के लिए गन्ना उत्पादन तकनीक

References

1. Anonymous (2006). Water and related statistics. Water Resources Information System Directorate, Central Water Commission, New Delhi.
2. Prasad, S. R., Alam, M. and Singh, R. N. (1987). Role of skip furrow irrigation in increasing waster use efficiency in sugarcane under Staggered Row Planting, Indian Sugar 36 (11):569-573.
3. Singh S. N., Singh, S. B. and Singh, N. P. (1994). Effect of moisture regimes and methods of irrigation on growth, yield, quality and water economy in sugarcane crop. Proceeding of All India Seminar on Water Managent held at Jalgaon, Maharastra on March 13, 1994 pp. 7-12.
4. Hapse, D. G., Deshmukh, A. S. and Shinde, P.P. (1991). Techno-economic valuation of drip irrigation system in sugarcane crop. Proceeding of National Seminar on Modern Irrigation Techniques in sugarcane Farming Systems held at VSI, Manjari, Pune on Sep. 4-5, 1991.
5. Parikh, M. M., Shrivastava, P. K., Savani, N. G. and Raman, S. (1992). Response opf sugarcane crop to drip method of irrigation. Cooperative Sugar 23(10):673-677.
6. Motivale, M. P. and Singh. A.B. (1971). Effect of trsh mulch in economy of water and fertilizer use in sugarcane, Annual report IISR, Lucknow, pp.23-24.
7. Yadav, R. L. and Prasad, S. R. (1988). Moisture use characteristics of sugarcane genotypes under different available soil moisture regimes in alluvial entisols, J. Agric. Sci. Camb 110 (1): 5-11.

Beneficiary farmers under FPARP (2008-09)

District- Barabanki

I) Block- Hydergarh Sugar Mill- Balrampur Chini Mill, Hydergarh

S. No.	Technology	Name	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
Village – Garhi Satrahi					
1	Trash mulching	Jagjivan Bux singh S/O Ram Pal Singh	01.03.2008	CoS 91248	1.0
2	Skip furrow method of iiigation	Dal Bahadur S/O Jagjivan Bux singh	02.03.2008	CoS 91248	1.0
3	Irrigation at Critical Growth Stages (ICGS)	Smt. Mamta Singh W/O Rajendra Pratap Singh	04.03.2008	CoS 91248	1.0
Village- Beejapur					
1	Trash mulching in ratoon	1. Ram Adhar S/O Gurudayal	05.03.2008	CoS 8432	0.25
		2. Barsati S/O Ram Dutt	05.03.2008	CoS 8432	0.25
		3. Ganesh Bux S/O Chhatra Pal	05.03.2008	CoS 8432	0.50
		4. Subham Singh S/O Pratap Bahadur Singh	12.03.2008	CoS 8432	1.00
2	Skip furrow method of irrigation	Manoj Singh S/O Narendra Bahadur Singh	19.03.2008	CoS 91248	1.00
3	ICGS	Santosh Singh S/O Pratap Bahadur Singh	16.03.2008	CoS 91248	1.00

II) Block- Dariyabad Sugar Mill- Balrampur Chini Mill, Rauzagaon

S. No.	Technology	Name	Date of planting/ratoon initiation	Sugarcane variety	Area (ha)
Village- Saidkhanpur					
1	Trash mulching	Desh Raj Verma S/O Gurdin	07.03.2008	CoS 8432	1.00
2	Skip furrow method of irrigation	Manendra Singh S/O Dinesh Singh	04.03.2008	CoS 8432	1.00
3	ICGS	Shushila Devi W/O Devendra	18.03.2008	CoSe 92423	0.5
		Pratap Bahadur S/O Jaibux Singh	18.03.2008	CoSe 92423	0.5
Village- Udvatnagar					
1	Trash mulching	Bharat Kishore S/O Sharda Prasad	20.03.2008	CoSe 92423	1.00
2	Skip furrow method of irrigation	1. Chandra Shekhar Tewari S/O Surya Prasad Tewari	30.03.2008	CoSe 92423	1.00
		2. Ram Sundar Tewari S/O Gokul Prasad Tewari	15.03.2008	CoSe 92423	0.50
		3. Ramendra Kumar S/O Bharat Kishore	05.04.2008	CoS 98231	0.50
3	I CGS	Anoop Kumar Sharma S/O Sheo Dulare Sharma	18.03.2008	CoS 96269, CoS 96275, CoS 98231	1.00

District- Sitapur

I) Block- Biswan **Sugar Mill- Biswan Sugar Mill, Biswan**

S. No.	Technology	Name	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
Village- Mouziddinpur					
1	Trash mulching	Hari Shankar S/O Bishambhar Dayal	12.03.08	CoS 97261	1.00
2	Skip furrow method of irrigation	Bindra Bux Singh S/O Surya Bux Singh	12.03.08	CoS 8436	1.00
		Iqbal Ahmad S/O Abdul Bari	26.03.08	CoS 8436	1.00
		Malti Devi W/O Manohar Lal	23.02.08	CoS 8436	1.00
		Abdul Bari S/O Sharif	20.02.08		1.00
3	Ring pit method of planting	Sagir khan S/O Mazid khan	04.03.08	CoS 8436	1.00
4.	ICGS	Mod. Taskeen S/O Badrud Jama	25.02.08	CoS 8436	1.00
		Sami Ullah khan S/O Abdullah Khan	03.03.08	CoS 8432	1.00
Village- Piperkalan					
1	Trash mulching	Smt. Mahrani W/O Sri Ram	25.02.08	CoS 8436	1.00
		Sarvajeet Singh S/O Balbir Singh	21.02.08	CoS 8436	1.00
2	Skip furrow method of irrigation	Manjit Singh S/O Balbir Singh	15.02.08	CoS 8436	1.00
		Gurmeet Singh S/O Basant Singh	26.02.08	CoS 8436	1.00
3	Ring Pit Planting	Ram Pal S/O Shatrohan Lal	25.03.08	CoS 88230	1.00
4	Irrigation at CGS	Sumeri Lal S/O Sri Ram	15.03.08	CoS 8436	1.00
		Kanhya Lal S/O Sri Ram	05.04.08	CoS 8436	1.00

II) Block- Sidhauli Sugar Mill- Kamalapur Sugar Mill, Kamlapur

S. No.	Technology	Name	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
Village- Muzzafferpur					
1	Trash mulching	Kaushlendra Singh S/O Surendra Vikram Singh	05.03.08	CoSe 92423	1.00
2	Skip furrow method of irrigation	Dhirendra Vikram Singh S/O Kaushlendra Vikram Singh	06.03.08	CoSe 92423	1.00
		Narendra Singh S/O Surendra Vikram Singh	08.03.08		1.00
3	ICGS	Shalendra Singh S/O Narendra Vikram Singh	12.03.08	CoSe 92423	1.00
Village- Devipur					
1	Trash Mulching	Nagendra Pratap Singh	28.03.08	Co S 97264	1.00
2	Skip furrow method of irrigation	Pradeep Singh Chauhan	31.03.08	Co S 96268	1.00

Beneficiary Farmers under FPARP (2009-2010)

District: Sitapur Sugar Mill- The Seksaria Biswan Sugar Mill, Biswan

S. No.	Name	Village	Technology	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
1	Shiv Prakash S/O Raghuraj Singh	Bambhor	Ring pit method of planting	25.02.09	CoSe 01424 CoS 96275 CoS 0097	1.00
2	Sushila Singh W/O Shiv Prakash	Bambhor	Skip furrow method of irrigation	28.02.09	CoSe 01424 CoS 96275 CoS 0097	1.00
3	Mulayam Singh S/O Tribhuwan Singh	Bambhor	Ring pit method of planting	31.03.09	CoS 98231 CoS 8432	1.00
4.	Ramesh Babu S/O Tulshi	Bambhor	Ring pit method of planting	06.03.09	CoS 8432	1.00
5	Bhagwant Singh	Bambhor	Skip furrow method of irrigation	14.03.09	CoSe 92423	1.00
6	Prabhakar Sharan Singh S/O Sant Bux Singh	Ghaila	Ring pit method of planting	12.03.09	CoS 8436	1.00
7	Shailendra Verma S/O Ramchandra Verma	Tikara	Ring pit method of planting	15.02.09	CoSe 98231	1.00
8	Ajay S/O Shri Asharfi Lal	Shankarpur	Ring pit method of planting	15.03.09	CoS 8436	1.00
9	Ram Kumar S/O Sarju Prasad	Shankarpur	Trash mulching	15.03.09	CoS 8436	1.00
10	Balaram S/o Gokaran	Kamiyapur	Ring pit method of planting	03.03.09	CoS 8436	1.00

S. No.	Name	Village	Technology	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
11	Ram Dutt S/O Gokaran	Kamiyapur	Irrigation at critical growth stages	06.03.09	CoS 8436	1.00
12	Sageer Khan S/ O Mazeed Khan	Mouziddinpur	Trash mulching	07.03.09	CoS 8436	1.00
13	Abdul Bari S/ O Sharif	Mouziddinpur	Trash mulching	26.02.09	CoS 8432 CoS 88230	1.00
14	Abdul Hadi S/ O Abdul Bari	Mouziddinpur	Skip furrow method of irrigation	10.02.09	CoS 88230	1.00
15	Syed Ali S/ O Madar Bux	Mouziddinpur	Ring pit method of planting	29.03.09	CoSe 92423	1.00
16	Ahmad S/ O Syed Ali	Mouziddinpur	Ring pit method of planting	31.03.09	CoS 97264	1.00
17	Jageshwar S/ O Sahdev	Mouziddinpur	Trash mulching	25.02.09	CoS 8436	1.00
18	Khaleel Ahmad S/ O Bilal Ahmad	Kamapur	Ring pit method of planting	30.03.09	CoS 8436	1.00
19	Devendra Nath S/ O Narendra Nath	Kotara	Ring pit method of planting of Planting	08.03.09	CoS 8436	1.00
20	Adtiya Nath S/ O Janki Nath	Januwa	Ring pit method of planting	08.03.09	CoS 96275	1.00
21	Jasbeer Singh S/ O Mahendra Singh	Puraini	Irrigation at critical growth stages	15.03.09	CoS 8436	1.00
22	Rajesh Kumar S/ O Parmeshar	Devkaliya	Skip furrow method of irrigation	25.03.09	CoS 95422	1.00
23	Lal Ji S/ O Ram Ashraya	Majagavan	Irrigation at critical growth stages	31.03.09	CoS 8436	1.00
24	Pradeep Singh Chauhan S/ O Nagendra Pratap Singh	Devipur*	Trash mulching	15.02.09	CoS 96268	1.00

District: Barabanki Sugar Mill- Balrampur Chini Mill, Rauzagaon

S. No.	Name	Village	Technology	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
1	Amrish Chand S/O Ram Kailash	Saidkahanpur	Ring pit method of planting	29.10.08	CoS 8436	0.50
	Vitthal Sharma S/O Prahladh	Saidkahanpur	Ring pit method of planting	15.11.08	CoS 8436	0.25
	Om Prakash S/O Bhai Lal	Saidkahanpur	Ring pit method of planting	03.11.08	CoS 8436	0.25
2	Tung Nath S/O Ram Kinkar	Saidkahanpur	Irrigation at critical growth stages	12.02.09	CoS 8436	1.00
3	Raj Kumar S/O Chhedi Lal	Saidkahanpur	Irrigation at critical growth stages	10.02.09	CoSe 92423	0.50
	Vinod Kumar S/O Shiv Paltan	Saidkahanpur	Irrigation at critical growth stages	05.03.09	CoSe 92423	0.50
4.	Avdhesh Kumar S/O Chhedi Lal	Saidkahanpur	Skip furrow method of irrigation	06.03.09	CoS 98231	0.50
	Atm Prakash Singh S/O Sahib Bux Singh	Saidkahanpur	Skip furrow method of irrigation	25.02.09	CoS 98231	0.50
5	Bhagwati S/O Dev kali	Saidkahanpur	Trash mulching	20.01.09	CoSe 92423	1.00
6	Neelam W/O Lavkush	Udvatnagar	Trash mulching	28.02.09	CoS 98231	1.00
7	Dhan pal Singh S/O Mahadev Singh	Udvatnagar	Skip furrow method of irrigation	17.04.09	CoS 98231	1.00
8	Mahendra Pratap Singh S/O Girija Bux Singh	Udvatnagar	Skip furrow method of irrigation	19.04.09	CoSe 92423	0.50
	Rupesh Kumar S/O Bharat Kishore	Udvatnagar	Skip furrow method of irrigation	19.04.09	CoSe 92423	0.50

District: Barabanki Sugar Mill- Balrampur Chini Mill, Hydergarh

S. No.	Name	Village	Technology	Date of planting/ratoon initiation	Sugarcane variety	Area (ha)
1	Saroj Singh W/O Mahendra Vikram Singh	Garhi Satrahi	Trash mulching	23.01.09	CoS 91248	1.00
2	Mata Badal Singh S/O Nankau Singh	Garhi Satrahi	Trash mulching	25.02.09	CoS 91248	1.00
3	Tej Bahadur Singh S/O Harihar Singh	Garhi Satrahi	Skip furrow method of irrigation	15.11.08	CoS 91248	1.00
4.	Shanti Devi W/O Pratap Bahadur Singh	Bijapur	Skip furrow method of irrigation	22.02.09	CoS 8432	1.00
5	Raj Kumari W/O Ganesh Bux Singh	Bijapur	Skip furrow method of irrigation	10.02.09 18.04.09	CoS 91248 CoS 91248	0.50 0.25
	Surendra Bahadur S/O Shiv Sagar Singh	Bijapur	Skip furrow method of irrigation	05.03.09	CoS 91248	0.25
	Rajendra Bahadur Singh S/O Shiv Sagar Singh	Bijapur	Skip furrow method of irrigation			
6	Indra Jeet Singh S/O Amrika Singh	Bijapur	Irrigation at critical growth stages	01.03.09	CoS 91248	0.50
	Ram deen Pal S/O Ram Adhar	Bijapur	Irrigation at critical growth stages	10.03.09	CoS 91248	0.50
7	Sankar Bux Singh S/O Girija Bux Singh	Bijapur	Irrigation at critical growth stages	10.03.09	CoS 8432	1.00
8	Sita Pati W/O Narendra Bahadur Singh	Bijapur	Trash mulching	28.02.09	CoS 91248	1.00

List of Beneficiary Farmers under FPARP (2010-2011)

District: Sitapur Sugar Mill- The Seksaria Biswan Sugar Mill, Biswan

S. No.	Name	Village	Technology	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
1	Laeek Khan S/O Samir Khan	Kaimahara	Skip furrow method of irrigation	23.02.10	CoS 8436	1.00
2	Iqbal Ahmad S/O Abdul Bari	Maijuddinpur	Skip furrow method of irrigation	28.02.10	CoS 767	1.00
3	Ramchandra Verma S/O Janki Prasad	Tikra	Skip furrow method of irrigation	26.02.10	Co 0238	1.00
4.	Maya Devi W/O Shalendra Verma	Tikra	Skip furrow method of irrigation	06.03.10	Co 0238	1.00
5	Banke Lal S/O Ramasre	Shankarpur	Skip furrow method of irrigation	14.02.10	CoS 8436	1.00
6	Shavitri Devi S/O Maiku Lal	Maijuddinpur	Irrigation at critical growth stages	12.02.10	Co S 767	1.00
7	Shamad Khan S/O Abdul Bari	Bakharia	Irrigation at critical growth stages	15.02.10	CoS 8436	1.00
8	Samun Khan S/O Irshad Khan	Parsehra	Irrigation at critical growth stages	15.02.10	CoSe 95422	1.00
9	Trimohan Lal S/O Mistri Lal	Majhiganwan	Irrigation at critical growth stages	15.02.10	U. P. 0097	1.00
10	Surya Prasad S/O Rameshwar	Benwaiya	Trash mulching	03.03.10	CoS 8436	1.00
11	Malti Devi W/O Suryprasad	Benwaiya	Trash mulching	06.03.10	CoS 96268	1.00
12	Ram Sewak Verma S/O Gajodhar Prasad	Ramkund	Trash mulching	07.03.10	CoS 8436	1.00
13	Ramesh Babu S/O Tulsi	Harsighpur	Trash mulching	26.02.10	CoS 8432	1.00
14	Aditya Nath S/O Janki Nath	Bhagwanpur Janua	Trash mulching	10.02.10	CoS 767	1.00
15	Ram Prasad S/O Hardwari	Benwaria	Trash mulching	9.03.10	CoS 98231	1.00
16	Pradip Singh Chauhan S/O Nagendra Singh Chauhan	Devipur	Trash mulching	13.02.10	CoS 96268	1.00

District: Barabanki Sugar Mill- Balrampur Chini Mill, Rauzagaon

S. No.	Name	Village	Technology	Date of planting/ ratoon initiation	Sugarcane variety	Area (ha)
1	Madan Lal S/O Ishwardin	Utwan	Trash mulching	13.02.10	CoS-92423	0.50
	Radhey Shyam S/O Shiv Dutt	Vir ki Thhayeen	Trash mulching	13.02.10	CoS-767	0.50
2	Ram Avtar S/O Ram Prasad	Akbarpur	Skip furrow method of irrigation	3.02.10	CoS 97264	0.5
	Lila Singh W/O Atmprakash	Saidkahanpur	Skip furrow method of irrigation	8.02.10	CoS 97264	0.5
3	Ram Pal S/O Ram Ratan	Gangauli	Irrigation at critical growth stages	18.02.10	CoS 97264	1.0
4	Birendra Bahadur Singh S/O Maharaj Bux Singh	Dhamapur	Irrigation at critical growth stages	16.02.10	CoS 97264	1.0
5	Sidhdhanath S/O Mata Prasad	Sisauna	Ring pit method of planting	14.10.09	Co S -8436	1.0

District: Barabanki Sugar Mill- Balrampur Chini Mill, Hydergarh

S. No.	Name	Village	Technology	Date of planting/ratoon initiation	Sugarcane variety	Area (ha)
1	Rampher Shukla S/O Rampyare	Budhnapur	Skip furrow method of irrigation	13.02.10	CoS 91248	1.00
2	Ram Milan Yadav S/O Khushiram	Kanwan	Skip furrow method of irrigation	15.02.10	CoS 91248	0.50
	Rajesh Kumar Singh S/O Mahendra Pal Singh	Kanwan	Skip furrow method of irrigation	13.02.10	CoS 91248	0.50
3	Raj Kumar Singh S/O Mahendra Pal Singh	Kanwan	Irrigation at critical growth stages	12.02.10	CoS 91248	1.00
4.	Brajendra Pal Singh S/O Jagannath Singh	Kanwan	Skip furrow method of irrigation	11.02.10	CoS 91248	0.50
	Kuwanr Singh Kachhawah	Balwapur	Skip furrow method of irrigation	15.02.10	CoS 91248	0.50

Annexure-IV

Village wise-data for FPARP Evaluation (2008-09)

Name of State, District and Village: Uttar Pradesh, Barabanki, Garhi Satrahi

Agro climatic zone : Upper Gangetic Plain Region, Average annual rainfall of the location: 787 mm

Particulars		Name of farmer: Dal bahadur	Jagjivan Bux Singh	Mamta Singh
Details of the farmer/farmers participating in the action research:	Age	50	65	35
	Sex	Male	Male	Female
	Experience in Farming (in years)	32	45	15
	Education qualification	Degree	Illiterate	Intermediate
	Total area owned (ha) – Irrigated	5	3	2
	Total area owned (ha) – Dry land	1	-	-
	Source of irrigation	Tube well, canal	Tube well, canal	Tube well,
	Major crops grown	Sugarcane, mentha, urd, lentil, pea, paddy, wheat	Sugarcane, mentha, pea, paddy, wheat	Sugarcane, mustard, paddy, wheat, lentil
	Knowledge in water management	Average	Poor	Poor
	Average income of the farmer from crops (Rs/year /ha)	35, 000	30, 000	25, 000
	Average income from non agriculture (Rs/year)	-	-	-
Details of the action research	Soil Type	Sandy loam	Sandy loam	Sandy loam
	Name of the crop	Sugarcane	Sugarcane	Sugarcane
	Season	Spring '08	Spring '08	Spring '08
	Area under action research (ha)	1	1	1
	Type of irrigation technology used	Skip furrow method of irrigation	Flood method	Irrigation at critical growth stages

Cost of irrigation tech. used	Capital cost (Rs/ha)		1150	1875	-
	Life of material (Rs)		One crop season	One crop season	-
	Operational cost (Rs/ha)		1440	1800	1700
	Labour (Rs/ha)		300	200	200
	Others (Rs/ha)		1140	1600	1500
	Total cost of cultivation (Rs/ha)		30,000	29, 000	27,000
	Cost shared by implementing institution (Rs/ha)		10,000	11, 350	6,610
	Cost shared by farmer (Rs/ha)		20,000	17, 650	20, 390
Water used for crop under action research project		Depth of irrigation (cm)	10	10	10
		No. of irrigations	5	5	4
Water used in conventional irrigation		Depth of irrigation (cm)	14	15	14
		No. of irrigations	5	5	5
Type of crop related technology			Skip furrow method of irrigation	Trash mulching	Irrigation at critical growth stages
Crop yield and income	Yield (t/ha)		74	65	72
	Value of the main product		1,03,600	91,000	1,00,800
	Value of the by- product		3700	3250	3600
	Yield under conventional irrigation (t/ha)		57	46	60
Number of farmer visiting the action research			4	3	5
Number of farmers willing to adopt technology			3	2	4
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future
Constraints faced			Non-availability of labour	Nil	Nil
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

Name of State, District and Village: Uttar Pradesh, Barabanki, Bijapur

Agro climatic zone : Upper Gangetic Plain Region **Average rainfall of the location: 787 mm**

Particulars / Name of farmer			Subham Singh	Barshati	Manoj Singh	Ramadhar	Santosh Singh	Ganesh Bux Singh
Details of the farmer/farmers participating in the action research:	Age		25	50	33	70	32	57
	Sex		Male	Male	Male	Male	Male	Male
	Experience in Farming (in years)		6	35	14	43	10	35
	Education qualification		Middle	Illiterate	High School	Illiterate	Intermediate	Intermediate
	Total area owned (ha)	Irrigated	1.5	0.5	1.25	1	3.0	2.0
		Dry land	10	-	-	-	-	-
	Source of irrigation		Tube well, canal	Canal	Tube well, canal	Tube well	Tube well, canal	Tube well, canal
	Major crops grown		Sugarcane, wheat, paddy,	Sugarcane, wheat, paddy,	Sugarcane, wheat, paddy, mustard	Sugarcane, wheat, paddy, mustard	Sugarcane, wheat, paddy, mustard	Sugarcane, wheat, paddy
	Knowledge in water management		Average	Average	Average	poor	Average	Average
	Average income of the farmer from crops (Rs/year /ha)		35,000	25, 000	40, 000	40,000	50, 000	40,000
	Average income from non agriculture (Rs/year)		-		-	-	-	-
Details of the action research	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '08	Spring '08	Spring '08	Spring '08	Spring '08	Spring '08
	Area under action research (ha)		1	0.25	1	0.25	1	0.5
	Type of irrigation technology used		Flood method	Flood method	Skip Furrow method	Flood method	Skip furrow method of Irrigation	Trash Mulching

Cost of the irrigation technology used	Capital cost (Rs/ha)	1875	1875	1150	1875	1150	1875
	Life of material	One crop season	One crop season	One crop season	One crop season	One crop season	One crop season
	Operational cost (Rs/ha)	1700	2150	1800	2200	1550	2625
	Labour (Rs/ha)	200	150	200	200	300	225
	Others (Rs/ha)	1500	2000	1600	2000	1250	2400
	Total cost of cultivation (Rs/ha)	30,000	28,000	30,000	28,000	30,000	30, 000
	Cost shared by implementing institution (Rs/ha)	11,350	11350	10,000	11350	10,000	11350
	Cost shared by farmer (Rs/ha)	18,650	16650	20,000	16650	20,000	18650
Water used for crop under action research project	Depth of irrigation (cm)	10	8	8	10	10	10
	No. of irrigations	4	5	5	4	4	5
Water used in conventional irrigation	Depth of irrigation (cm)	15	10	12	15	15	12
	No. of irrigations	4	3	4	4	4	5
Type of crop related technology		Trash mulching	Trash mulching	Skip Furrow method of irrigation	Trash mulching	Skip Furrow method of irrigation	Trash mulching
Crop yield and income due to action research	Yield (t/ha)	65	66	72	65	74	66
	Value of the main product	91,000	92,400	1,00,800	91,000	1,036,00	92,400
	Value of the by- product	3250	3200	3600	3250	3700	3200
	Yield under conventional irrigation (t/ha)	46	46	58	47	59	47
Number of farmer visiting the action research		4	4	5	4	5	4
Number of farmers willing to adopt technology		3	3	4	3	4	4
Lesson learned from the action research		Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future		Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced		Non-availability of labour	Non-availability of labour	Need more labour	Need more labour	Ti technical to adopt	Ti technical to adopt
Farmers opinion about implementing research team		Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowled-geable and helpful	Knowled-geable and helpful	Knowledgeable and helpful

Name of State, District and Village: Uttar Pradesh, Barabanki, Udvatnagar

Agro climatic zone : Upper Gangetic Plain Region, Average annual rainfall of the location: 787 mm

Particulars / Name of farmer			Anoop Sharma	Chandra Shekhar	Ram Sundar Tiwari	Ramender Kumar	Bharat Kishore
Details of the farmer/farmers participating in the action research:	Age		38	42	60	38	70
	Sex		Male	Male	Male	Male	Male
	Experience in Farming (in years)		13	20	45	20	52
	Education qualification		Graduate	Intermediate	Intermediate	Intermediate	Middle
	Total area owned (ha)	Irrigated	2.5	1.8	1.5	1	3.4
		Dry land	-	-	-	-	-
	Source of irrigation		Tube well	Tube well	Tube well	Tube well, canal	Tube well, canal
	Major crops grown		Sugarcane, wheat, paddy, mentha & mustard	Sugarcane, wheat, paddy, mentha & mustard ,	Sugarcane, wheat, lentil paddy, Mustard	Sugarcane, wheat, lentil paddy, Mustard	Sugarcane, wheat, lentil , paddy, Mustard
	Knowledge in water management		Average	Average	Poor	Average	Average
	Average income of the farmer from crops (Rs/year /ha)		60, 000	50, 000	40,000	60,000	60,000
	Average income from non agriculture (Rs/year)		25, 000	-	-	-	-
Details of the action research	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam,
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '08	Spring '08	Spring '08	Spring '08	Spring '08
	Area under action research (ha)		1	1	0.5	0.5	1
	Type of irrigation technology used		Irrigation at critical growth stages	Skip furrow Irrigation	Skip furrow Irrigation	Skip furrow Irrigation	Flood method

Cost of the irrigation technology used		Capital cost (Rs/ha)	-	1150	1150	1150	1875
		Life of material	-	One crop season	One crop season	One crop season	One crop season
		Operational cost (Rs/ha)	1500	1800	1800	1800	1600
		Labour (Rs/ha)	150	200	200	200	150
		Others (Rs/ha)	1350	1600	1600	1600	1450
		Total cost of cultivation (Rs/ha)	27,000	29000	29000	30,000	28,000
		Cost shared by implementing institution (Rs/ha)	6, 610	10,000	10,000	10,000	11,350
		Cost shared by farmer (Rs/ha)	20, 390	19000	19000	20,000	16,650
Water used for crop under action research project		Depth of irrigation (cm)	10	10	10	10	10
		No. of irrigations	4	5	5	4	4
Water used in conventional irrigation		Depth of irrigation (cm)	15	12	15	14	15
		No. of irrigations	5	5	6	6	5
Type of crop related technology			Irrigation at critical growth stages	Skip furrow Irrigation	Skip furrow Irrigation	Skip furrow irrigation	Trash Mulching
Crop yield and income due to		Yield (t/ha)	70	73	75	78	74
		Value of the main product	98, 000	102200	105000	109200	103600
		Value of the by- product	-	-	-	-	-
		Yield under conventional irrigation (Kg/ha)	55	55	60	58	55
Number of farmer visiting the action research			4	3	2	2	5
Number of farmers willing to adopt technology			5	5	3	3	3
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology	Improved existing method	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced			Nil	Need more labour	Nil	Nil	Nil
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

Name of State, District and Village: Uttar Pradesh, Barabanki, Saidkhanpur

Agro climatic zone : Upper Gangetic Plain Region Average rainfall of the location: 787 mm

Particulars	Name of farmer	Desh Raj Verma	Pratap Bahadur	Sushila Devi	Mahendra Singh
Details of the farmer/farmers participating in the action research:	Age	50	55	50	24
	Sex	Male	Male	Female	Male
	Experience in Farming (in years)	30	32	30	4
	Education qualification	High School	Middle	High School	Intermediate
	Total area owned (ha) — Irrigated	6.2	3.5	2	3
	Total area owned (ha) — Dry land	-	-		
	Source of irrigation	Tube well	Tube well & canal	Tube well,	Tube well,
	Major crops grown	Sugarcane, wheat, paddy, Potato, Mustard	Sugarcane, wheat, paddy, mentha & mustard	Sugarcane, wheat, paddy, Mentha	Sugarcane, wheat, mentha, paddy, Mustard
	Knowledge in water management	Average	Average	Poor	Average
	Average income of the farmer from crops (Rs/year /ha)	50,000	25, 000	30,000	30,000
	Average income from non agriculture (Rs/year)	25, 000	-	-	-
Details of the action research	Soil Type	Sandy loam	Sandy loam,	Sandy loam,	Sandy loam,
	Name of the crop	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season	Spring '08	Spring '08	Spring '08	Spring '08
	Area under action research (ha)	1	0.5	0.5	1
	Type of irrigation technology used	Flood	Irrigation at Critical Growth stages	Irrigation at Critical growth stages	Skip furrow Irrigation

	Cost of the irrigation technology used	Capital cost (Rs/ha)	1875	-	-	1150
		Life of material	One crop season	-	-	-
		Operational cost (Rs/ha)	1600	1550	2100	1500
		Labour (Rs/ha)	200	200	200	200
		Others (Rs/ha)	1400	1350	1920	1300
		Total cost of cultivation (Rs/ha)	30,000	29000	26,000	30,000
		Cost shared by implementing institution (Rs/ha)	11,350	10,000	6,610	10,000
		Cost shared by farmer (Rs/ha)	18,650	19000	20,000	20,000
	Water used for crop under action research project	Depth of irrigation (cm)	10	10	10	10
		No. of irrigations	4	5	5	5
	Water used in conventional irrigation	Depth of irrigation (cm)	15	12	15	15
		No. of irrigations	5	5	5	5
	Type of crop related technology		Trash mulching	Irrigation at Critical Growth stages	Irrigation at Critical Growth stages	Skip furrow method
Crop yield and income due to action research	Yield (t/ha)		70	75	70	78
	Value of the main product		101500	105000	101500	109200
	Value of the by- product		-	-	-	-
	Yield under conventional irrigation (Kg/ha)		60	60	60	60
Number of farmer visiting the action research			4	3	2	2
Number of farmers willing to adopt technology			6	4	6	6
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology	Learned new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced			Non-availability of labour	Nil	Nil	Need more labour
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

Name of State, District and Village: Uttar Pradesh, Sitapur, Maizuddinpur

Agro climatic zone : Upper Gangetic Plain Region Average annual rainfall of the location: 780 mm

Particulars \ Name of farmer		Shami ullah khan	Mohd. Taskeen	Abdul Bari	Malti Devi	Iqbal Ahamad	Shagir Khan	Bindra Bux Singh	Hari Shankar
Details of the farmer/farmers participating in the action research:	Age	55	20	65	60	50	65	75	70
	Sex	Male	Male	Male	Female	Male	Male	Male	Male
	Experience in Farming (in years)	45	5	50	30	35	45	60	45
	Education qualification	Primary	High School	High School	Primary	Degree	High School	Inter-mediate	Degree
	Total area owned (ha) Irrigated	3.2	1.6	4	3.2	2	1.6	6.5	3.2
	Total area owned (ha) Dry land	-	-	-			-	-	-
	Source of irrigation	Tube well	Tube well,	Tube well	Tube well	Tube well	Tube well	Tube well	Tube well
	Major crops grown	Sugarcane, wheat, paddy, Potato, Mustard	Sugarcane, wheat, paddy, mentha	Sugarcane, orchard, paddy, wheat, mustard, potato	Sugarcane, mentha, paddy, wheat, mustard arhar,	Sugarcane, paddy, wheat, mustard, potato,	Sugarcane, paddy, wheat, mustard, potato	Sugarcane, paddy, wheat, mentha, mustard, potato, arhar	Sugarcane, paddy, wheat, mentha, mustard, potato, arhar
	Knowledge in water management	Average	Average	Good	Average	Average	Good	Average	Average
	Average income of the farmer from crops (Rs/year /ha)	22,000	23, 000	18000	19500	22000	19,000	20,000	21,000
	Average income from non agriculture (Rs/year)	1 000	2000	-	-	2000	2000	-	-
Details of the action research	Soil Type	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season	Spring '08	Spring '08	Spring '08	Spring '08	Spring '08	Spring '08	Spring '08	Spring '08
	Area under action research a)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Type of irrigation technology used	Irrigation at critical growth stages	Irrigation at critical growth stages	Skip furrow method	Skip furrow method	Skip furrow method	Irrigation pits through narrow interconnecting channels.	Skip furrow method	Flood irrigation

Cost of the irrigation technology used	Capital cost (Rs/ha)	-	-	1150	1150	1150	11,,000	1150	1875
	Life of material	-	-	-	-	-	One crop season	One crop season	One crop season
	Operational cost (Rs/ha)	1750	2500	1300	1800	1900	2300	1300	1825
	Labour (Rs/ha)	150	300	150	150	150	300	150	225
	Others (Rs/ha)	1600	2200	1140	1650	1750	2000	1150	1600
	Total cost of cultivation (Rs/ha)	32,000	32, ,000	28,000	-	-	54350	36,000	28,000
	Cost shared by implementing institution (Rs/ha)	6,610	6,610	10,000	10,000	10,000	30,350	10,000	11,350
	Cost shared by farmer (Rs/ha)	24,400	25,390	26,000	25,000	24,000	24,000	26,000	16,650
Water used for crop under action research project	Depth of irrigation (cm)	10	10	12	12	12	5	12	10
	No. of irrigations	5	5	5	5	5	8	5	4
Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12	10	12	12	12	12
	No. of irrigations	6	6	6	5	5	6	5	5
Type of crop related technology		Irrigation at critical growth stages	Irrigation at critical growth stages	Skip furrow method of irrigation	Skip furrow method	Skip furrow method of irrigation	Ring pit method of planting	Skip furrow method of irrigation	Trash mulching

Crop yield and income due to action research	Yield (t/ha)	100	86	130	100	75	112	100	88
	Value of the main product	1,40,000	1,20,400	1,82,000	1,45,000	1,08,750	1,62,400	1,45,000	1,23,200
	Value of the by- product	4,000	4,000	5,000	4,000	3000	4000	4000	3000
	Yield under conventional irrigation (t/ha)	80	70	85	60	55	75	60	50
Number of farmer visiting the action research		4	3	5	2	3	4	3	5
Number of farmers willing to adopt technology		3	2	4	3	2	3	2	4
Lesson learned from the action research		Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future		Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced		Need technical expert support every time	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Farmers opinion about implementing research team		Knowledge-able and helpful	Helpful throughout the season	Knowledge-able and helpful	Helpful throughout the season	Helpful throughout the season	Willing-ness to help	Knowled-geable and helpful	Knowled-geable and helpful

Name of State, District and Village : Uttar Pradesh, Sitapur, Piprakalan

Particulars		Name of farmer	Manjit Singh	Gurmeet Singh	Karahai Lal	Sumeri Lal	Sarvjeet Singh	Ram Pal	Smt. Maharani
Details of the farmer/farmers participating in the action research	Age		52	40	42	40	45	50	68
	Sex		Male	Male	Male	Male	Male	Male	Female
	Experience in Farming (in years)		30	22	25	20	25	30	50
	Education qualification		High School	High School	Primary	Middle	Intermediate	Intermediate	Illiterate
	Total area owned (ha)	Irrigated	2.5	2.5	1.5	2.5	3	2	2
		Dry land	-	-		-			-
	Source of irrigation		Tube well	Tube well	Tube well	Tube well	Tube well	Tube well	Tube well
	Major crops grown		Sugarcane, wheat, paddy	Sugarcane, mentha, wheat, paddy, mustard	Sugarcane, wheat, paddy, mustard	Sugarcane, wheat, mentha, mustard	Sugarcane, wheat, mentha, mustard, paddy	Sugarcane, wheat, mentha, mustard, paddy	Sugarcane, wheat, mustard, paddy
	Knowledge in water management		Average	Average	Average	Average	Average	Average	Poor
	Average income of the farmer from crops (Rs/year /ha)		21,000	25,000	15,000	18,000	25,000	21,000	16,000
	Average income from non agriculture (Rs/year)		-	-	-	-	-	-	-
Details of the action research	Soil Type		Clay loam	Loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring, 2008	Spring, 2008	Spring, 2008	Spring, 2008	Spring, 2008	Spring, 08	Spring 08
	Area under action research (ha)		1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Type of irrigation technology used		Skip furrow method	Skip furrow method	Irrigation at critical growth stages	Irrigation at critical growth stages	Flood	Check basin method	Flood

Cost of the irrigation technology used	Capital cost (Rs/ha)		1150	1150	-	-	1875	11,000	1875
	Life of material		One crop season	One crop season	-	-	One crop season	One crop season	One crop season
	Operational cost (Rs/ha)		1440	1440	2700	2500	1460	2420	2720
	Labour (Rs/ha)		300	300	300	300	320	320	320
	Others (Rs/ha)		1140	1140	2400	2200	1140	2100	2400
	Total cost of cultivation (Rs/ha)		35,000	35,000	33,000	32,110	30,000	54,350	29,000
	Cost shared by implementing institution (Rs/ha)		10,000	10,000	6,610	6,610	11,350	30,350	11,350
	Cost shared by farmer (Rs/ha)		25,000	25,000	26,390	25,500	18,650	24,000	17,650
	Water used for crop under action research project	Depth of irrigation (cm)	7	7	10	10	10	5	10
		No. of irrigations	5	5	4	5	4	7	4
	Water used in conventional irrigation	Depth of irrigation (cm)	10	10	10	12	10	10	10
		No. of irrigations	5	5	5	6	5	5	5
	Type of crop related technology		Skip furrow irrigation	Skip furrow irrigation	Irrigation at critical growth stages	Irrigation at critical growth stages	Trash Mulching	Ring pit planting method	Trash Mulching
Crop yield and income	Yield (Kg/ha)		106	100	105	106	100	85	90
	Value of the main product		1,48,400	1,40,000	1,47,000	1,48,400	1,40,000	1,19,000	1,30,500
	Value of the by- product		5000	5000	5000	5,000	5,000	4,000	4,000
	Yield under conventional irrigation (Kg/ha)		70	75	65	65	65	65	60
Number of farmer visiting the action research			4	4	4	4	3	5	4
Number of farmers willing to adopt technology			3	5	5	3	2	4	3
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced			Nil	Nil	Nil	Nil	Nil	Nil	Nil
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

Village-wise data for FPARP Evaluation (2009-10)

Name of State: Uttar Pradesh, District: Sitapur, Agro climatic zone: Upper Gangetic Plain Region
Average annual rainfall of the location: 780 mm

Particulars			Name of farmer and village: Shiv Prakash (Bambhor)	Sushila Singh (Bambhor)	Mulayam Singh (Bambhor)	Ramesh Babu (Bambhor)	Bhagvati Singh (Bambhor)
Details of the farmer/farmers participating in the action research	Age (year)		38	33	65	35	55
	Sex		Male	Female	Male	Male	Male
	Experience in Farming (in years)		15	10	40	12	15
	Education		Graduate	Graduate	Intermediate	Graduate	Intermediate
	Total area owned (ha)	Irrigated	4.5	4.5	6.0	3.5	3.5
		Dryland	-	-	0.5	-	0.5
	Source of irrigation		Tube well, canal	Tube well, canal	Tube well, pump set	Tube well, canal	Tube well, pump set
	Major crops grown		Sugarcane, wheat, potato, mustard	Sugarcane, wheat, potato, mustard	Sugarcane, wheat, potato, mustard, paddy, orchard	Sugarcane, mustard pea, paddy, wheat	Sugarcane, mustard, paddy, wheat, lentil
	Knowledge in water management		Average	Good	Average	Poor	Average
	Average income of the farmer from crops (Rs/year /ha)		30, 000	30, 000	27,000	26, 000	25, 000
	Average income from non agriculture (Rs/year)		10,000	10,000	-	5000	20000
Details of the action research	Soil Type		Loam	Loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season of planting		Spring '09	Spring '09	Spring '09	Spring '09	Spring '09
	Area under action research (ha)		1	1	1	1	1
	Type of irrigation technology used		Irrigating pits through narrow interconnecting channels	Irrigation through furrows made in alternate rows	Irrigating pits through narrow interconnecting channels	Irrigating pits through narrow interconnecting channels	Irrigation through furrows made in alternate rows
	Cost of irrigation tech. used	Capital cost (Rs/ha)	11,000	1200	11,000	11,000	1200
		Life of material	One crop season	One crop season	One crop season	One crop season	One crop season
		Operational cost (Rs/ha)	2400	1400	2400	2400	1400
		Labour (Rs/ha)	400	200	400	400	200
		Others (Rs/ha)	2000	1200	2000	2000	1200
		Total cost of cultivation (Rs/ha)	55,000	30,000	55,000	55,000	30,000

		Cost shared by implementing institution (Rs/ha)	31,000	10,000	31,000	31,000	10,000
		Cost shared by farmer (Rs/ha)	24,000	20,000	24,000	24,000	20,000
	Water used for crop under action research project	Depth of irrigation (cm)	8	10	8	8	10
		No. of irrigations	7	6	7	7	6
	Water used in conventional irrigation	Depth of irrigation (cm)	10	12	12	12	12
		No. of irrigations	6	6	6	6	6
	Type of crop related technology		Ring pit method of planting	Skip furrow method of irrigation	Ring pit method of planting	Ring pit method of planting	Skip furrow method of irrigation
Crop yield & income due to	Yield (t/ha)		160	120	145	152	102
	Value of the main product		352000	264000	319000	334400	224400
	Value of the by- product		-	-	-	-	-
	Yield under conventional irrigation (t/ha)		75	70	76	78	72
Number of farmers visiting the action research			5	4	5	5	5
Number of farmers willing to adopt technology			7	10	6	5	10
Lesson learned from the action research			obtain more yield by cane planting in pits	water saving by applying water in skip furrows	obtain more yield by cane planting in pits	obtain more yield by cane planting in pits	water saving by applying water in skip furrows
Follow-up in future			will continue this practice in future	will continue this practice in future	will continue this practice in future	will continue this practice in future	will continue this practice in future
Constraints faced			more labour requirement and high cost	nil	more labour requirement and high cost	more labour requirement and high cost	nil
Farmer's opinion about implementing research team			cooperative and receptive	cooperative and receptive	cooperative and receptive	cooperative and receptive	cooperative and receptive

Name of State: Uttar Pradesh, District: Sitapur, Agro climatic zone : Upper Gangetic Plain Region

Average annual rainfall of the location: 780 mm

Particulars		Name of farmer and village	Abdul Hadi (Maizuddin-pur)	Syed Ali (Maizuddin-pur)	Abdul Bari (Maizuddin-pur)	Ahmad (Maizuddin-pur)	Jageshwar (Maizuddin-pur)	Shagir Khan (Maizuddin-pur)	Prabhakar Sharan Singh (Ghaila)	Shalendra Verma (Tikra)
Details of the farmer/farmers participating in the action research:	Age (years)		35	65	66	35	50	66	55	38
	Sex		Male	Male	Male	Male	Male	Male	Male	Male
	Experience in Farming (in years)		14	38	50	16	28	46	30	18
	Education		Intermediate	Graduate	High School	Intermediate	Intermediate	High School	Post graduate	Post graduate
	Total area owned (ha)	Irrigated	3.0	4.0	4	3.5	6.5	1.6	8.0	5.0
		Dry land	-	1.0	-	-	0.5	-	-	-
	Source of irrigation		Tube well	Tube well, Pump set	Tube well	Tube well	Tube well	Tube well	Tube well, Canal	Tube well
	Major crops grown		Sugarcane, wheat, paddy, potato, mustard, garlic, Onion	Sugarcane, wheat, paddy, mentha	Sugarcane, orchard, paddy, wheat, mustard, potato	Sugarcane, paddy, wheat, mustard, arhar	Sugarcane, paddy, wheat, mustard, potato	Sugarcane, paddy, wheat, mustard, potato	Sugarcane, Paddy, wheat, mentha, mustard, potato, arhar	Sugarcane, paddy, wheat, mentha, mustard, potato, arhar
	Knowledge in water management		Average	Average	Good	Average	Average	Good	Average	Average
	Average income of the farmer from crops (Rs/year /ha)		28,000	25, 000	24, 000	28, 000	26, 000	26, 000	26,000	25,000
	Average income from non agriculture (Rs/year)		1 0,000	2000	-	-	20, 000	20, 000	25, 000	-

Details of the action research									
Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
Season		Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09
Area under action research (ha)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Type of irrigation technology used		Irrigating through furrows made in alternate rows	Irrigating pits through narrow interconnecting channels.	Flood Method	Irrigating pits through narrow interconnecting channels.	Flood Method	Flood Method	Irrigating pits through narrow interconnecting channels	Irrigating pits through narrow interconnecting channels
Cost of the irrigation technology used	Capital cost (Rs/ha)	1200	11,000	1900	11,000	1900	1900	11,000	11,000
	Life of material	One crop season	One crop season	One crop season	One crop season	One crop season	One crop season	One crop season	One crop season
	Operational cost (Rs/ha)	1400	2400	2000	2400	2000	2000	2400	2400
	Labour (Rs/ha)	200	400	300	400	300	300	400	400
	Others (Rs/ha)	1200	2000	1700	2000	1700	1700	2000	2000
	Total cost of cultivation (Rs/ha)	30,000	55,000	28,000	55,000	28,000	28,000	55,000	55,000
	Cost shared by implementing institution (Rs/ha)	10,000	31,000	11,500	31,000	11,500	11,500	31,000	31,000
	Cost shared by farmer (Rs/ha)	20,000	24,000	16, 500	24,000	16, 500	16, 500	24,000	24,000
Water used for crop under action research project	Depth of irrigation (cm)	10	8	10	8	10	10	8	8
	No. of irrigations	6	7	5	7	5	5	7	7
Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12	12	12	12	12	12
	No. of irrigations	6	6	6	6	6	6	5	6
Type of crop related technology		Skip furrow method of irrigation	Ring pit method of planting	Trash Mulching	Ring pit method of planting	Trash Mulching	Trash Mulching	Ring pit method of planting	Ring pit method of planting

Crop yield and income due to action	Yield (t/ha)	108	130	108	130	116	97	148	140
	Value of the main product	243000	286000	237600	286000	255200	213400	333000	315000
	Value of the by- product	-	-	-	-	-	-	-	-
	Yield under conventional irrigation (t/ha)	65	72	65	76	64	60	72	78
Number of farmers visiting the action research		6	5	5	4	7	4	10	9
Number of farmers willing to adopt technology		12	4	8	4	8	7	4	3
Lesson learned from the action research		water saving by applying water in skip furrows	obtain more yield by cane planting in pits	Trash mulch in the field to save water	obtain more yield by cane planting in pits	Trash mulch in the field to save water	Trash mulch in the field to save water	Obtain more yield by cane planting in pits	Obtain more yield by cane planting in pits
Follow-up in future		Will continue this practice in future	Will continue this practice in future	Will continue to mulch trash in ratoon crop	Will continue this practice in future	Will continue to mulch trash in ratoon crop	Will continue to mulch trash in ratoon crop	Will continue this practice in future	Will continue this practice in future
Constraints faced		nil	More labour requirement and high cost	More labour required for collection and spreading of trash	More labour require-ment and high cost	More labour required for collection and spreading of trash	More labour required for collection and spreading of trash	More labour require-ment and high cost	More labour require-ment and high cost
Farmers opirion about implementing research team		cooperative and receptive	cooperative and receptive	cooperative and receptive	cooperative and receptive	cooperative and receptive	coopera-tive and receptive	coopera-tive and receptive	cooperative and receptive

Name of State: Uttar Pradesh, District: Sitapur, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 780 mm

Particulars	Name of farmer and village	Ajay (Sankarpur)	Balram (Kamiyapur)	Khalil Ahmad (Kamapur)	Devendra Nath (Kotra)	Adittya Nath (Janua)	Ram kumar (Sankarpur)	Pradip Singh Chauhan (Devipur)	Ramdatt (Kamiyapur)
Details of the farmer/farmers participating in the action research:	Age (years)	40	45	40	35	60	55	48	40
	Sex	Male	Male	Male	Male	Male	Male	Male	Male
	Experience in Farming (in years)	20	22	22	11	30	27	22	17
	Education	Eighth	Intermediate	Eighth	Graduate	Graduate	Inter-mediate	Graduate	High school
	Total area owned (ha) Irrigated	2.0	3.0	2	4.0	6.0	11.0	4.0	2.0
	Total area owned (ha) Dryland	-	-	-	0.5	-	1.0	-	-
	Source of irrigation	Canal	Tube well, Pump set	Tube well	Tube well	Tube well	Tube well, Canal	Tube well, Canal	Tube well
	Major crops grown	Sugarcane, wheat, paddy, potato, mustard	Sugarcane, wheat, paddy, mentha, potato	Sugarcane, paddy, wheat, mustard, potato	Sugarcane, paddy, wheat, mustard, arhar, potato, pea	Sugarcane, paddy, wheat, mustard, potato, pea	Sugarcane, paddy, wheat, mustard, potato, orchard, pea	Sugarcane, paddy, wheat, mentha, mustard, potato, arhar, orchard	Sugarcane, paddy, wheat, mustard, potato, arhar
	Knowledge in water management	Average	Good	Good	Average	Good	Good	Good	Average
	Average income of the farmer from crops (Rs/year /ha)	25,000	25, 000	26, 000	25, 000	28, 000	26, 000	30,000	26,000
	Average income from non agriculture (Rs/year)	5,000	-	-	-	1,50, 000	20, 000	5,00,000	5,000

Details of the action research										
Soil Type			Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	loam	Sandy loam
Name of the crop			Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
Season			Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09
Area under action research (ha)			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Type of irrigation technology used			Irrigating pits through narrow inter-connecting channels.	Irrigating pits through narrow inter-connecting channels.	Irrigating pits through narrow inter-connecting channels.	Irrigating pits through narrow inter-connecting channels.	Irrigating pits through narrow interco-nnecting channels.	Flood Method	Flood Method	Irrigation through channels
Cost of the irrigation technology used	Capital cost (Rs/ha)		11,000	11,000	11,000	11,000	11,000	1900	1900	-
	Life of material		One crop season	One crop season	One crop season	One crop season	One crop season	One crop season	One crop season	-
	Operational cost (Rs/ha)		2400	2400	2400	2400	2400	2000	2000	1800
	Labour (Rs/ha)		400	400	400	400	400	300	300	200
	Others (Rs/ha)		2000	2000	2000	2000	2000	1700	1700	1600
	Total cost of cultivation (Rs/ha)		55,000	55,000	55,000	55,000	55,000	28,000	28,000	30,000
	Cost shared by implementing institution (Rs/ha)		31,000	31,000	31,000	31,000	31,000	11,500	11,500	6,500
	Cost shared by farmer (Rs/ha)		24,000	24,000	24,000	24,000	24,000	16, 500	16, 500	23,500
Water used for crop under action research project	Depth of irrigation (cm)		8	8	8	8	8	10	10	10
	No. of irrigations		7	7	7	7	7	5	5	4
Water used in conventional irrigation	Depth of irrigation (cm)		12	12	12	12	12	12	12	12
	No. of irrigations		6	5	5	6	6	6	6	6

	Type of crop related technology	Ring pit method of planting	Ring pit method of planting	Ring pit method of planting	Ring pit method of planting	Ring pit method of planting	Trash mulching	Trash mulching	Irrigation at Critical growth stages
Crop yield and income due to action	Yield (t/ha)	144	164	155	170	140	105	95	102
	Value of the main product	324000	369000	348750	382500	308000	319000	209000	229500
	Value of the by- product	-	-	-	-	-	-	-	-
	Yield under conventional irrigation (t/ha)	76	83	80	84	74	74	72	80
Number of farmers visiting the action research		10	8	8	10	15	4	10	9
Number of farmers willing to adopt technology		4	3	4	4	4	6	7	4
Lesson learned from the action research		Obtain more yield by cane planting in pits	Obtain more yield by cane planting in pits	Obtain more yield by cane planting in pits	Obtain more yield by cane planting in pits	Obtain more yield by cane planting in pits	Trash mulch in the field to save water	Trash mulch in the field to save water	Saved one irrigation water
Follow-up in future		Will continue this practice in future	Will continue this practice in future	Will continue this practice in future	Will continue this practice in future	Will continue this practice in future	Will continue to mulch bytrash in ratoon crop	Will continue to mulch by trash in ratoon crop	Apply irrigation only at critical growth stages
Constraints faced		More labour require-ment and high cost	More labour requirement and high cost	More labour require-ment and high cost	More labour require-ment and high cost	More labour require-ment and high cost	More labour required for collection and spreading of trash	More labour required for collection and spreading of trash	Nil
Farmers opinion about implementing research team		Coopera-tive and receptive	Cooperative and receptive	Coopera-tive and receptive	Coopera-tive and receptive	Coopera-tive and receptive	Coopera-tive and receptive	Coopera-tive e and receptive	Coopera-tive and receptive

Name of State: Uttar Pradesh, District: Sitapur, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 780 mm

Particulars \ Name of farmer and village			Jasbir Singh (Puraini)	Lal Ji (Majgawan)	Rajesh Kumar (Devkaliya)
Details of the farmer/farmers participating in the action research:	Age (years)		45	40	35
	Sex		Male	Male	Male
	Experience in Farming (in years)		18	22	12
	Education		Illiterate	Intermediate	High school
	Total area owned (ha)	Irrigated	3.5	4.5	3.0
		Dry land	-	-	-
	Source of irrigation		Tube well	Tube well, canal	Tube well, pump set
	Major crops grown		Sugarcane, wheat, potato, mustard	Sugarcane, wheat, potato, mustard, Mentha, paddy	Sugarcane, wheat, potato, mustard, paddy
	Knowledge in water management		Average	Good	Good
	Average income of the farmer from crops (Rs/year /ha)		26, 000	30, 000	30,000
	Average income from non agriculture (Rs/year)		10,000	25,000	
Details of the action research	Soil Type		Loam	Loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane
	Season		Spring '09	Spring '09	Spring '09
	Area under action research (ha)		1	1	1
	Type of irrigation technology used		Irrigation through channels	Irrigation through channels	Irrigation through furrows made in alternate rows
	Cost of irrigation tech. used	Capital cost (Rs/ha)	-	-	1200
		Life of material (Rs)	-	-	One crop season
		Operational cost (Rs/ha)	1800	1800	1400
		Labour (Rs/ha)	200	200	200
		Others (Rs/ha)	1600	1600	1200

		Total cost of cultivation (Rs/ha)	30,000	30,000	30,000
		Cost shared by implementing institution (Rs/ha)	6,500	6,500	10,000
		Cost shared by farmer (Rs/ha)	23,500	23,500	20,000
	Water used for crop under action research project	Depth of irrigation (cm)	10	10	10
		No. of irrigations	5	5	6
	Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12
		No. of irrigations	6	6	6
	Type of crop related technology		Irrigation at Critical growth stages	Irrigation at Critical growth stages	Skip furrow method of irrigation
Crop yield & income due to	Yield (t/ha)		105	106	112
	Value of the main product		236250	238500	246400
	Value of the by- product		-	-	-
	Yield under conventional irrigation (t/ha)		70	70	66
Number of farmers visiting the action research			5	6	8
Number of farmers willing to adopt technology			5	5	6
Lesson learned from the action research			saved one irrigation water	saved one irrigation water	water saving by applying water in skip furrows
Follow-up in future			apply irrigation only at critical growth stages	apply irrigation only at critical growth stages	will continue this practice in future
Constraints faced			nil	nil	nil
Farmers opinion about implementing research team			cooperative and receptive	cooperative and receptive	cooperative and receptive

Name of State: Uttar Pradesh, District: Barabanki, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 787 mm

Particulars	Name of farmer and village		Amrish Chand (Saidkhanpur)	Vitthal Sharma (Saidkhanpur)	Omprakash (Saidkhanpur)	Tung Nath (Saidkhan-pur)	Raj Kumar (Saidkhan-pur)	Vinod Kumar (Saidkhan-pur)
Details of the farmer/farmers participating in the action research:	Age (years)		35	65	38	70	40	42
	Sex		Male	Male	Male	Male	Male	Male
	Experience in Farming (in years)		16	42	20	52	20	23
	Education		Intermediate	High school	High school	Primary	High school	Intermediate
	Total area owned (ha)	Irrigated	1.0	4.0	1.0	2.0	1.5	2.5
		Dryland	-	-	-	-	-	-
	Source of irrigation		Tube well	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well
	Major crops grown		Sugarcane, wheat, paddy, mentha, mustard	Sugarcane, wheat, paddy, mentha, potato	Sugarcane, paddy, wheat, mustard, onion, mentha, radish	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mentha, urd
	Knowledge in water management		Good	Good	Good	Poor	Poor	Good
	Average income of the farmer from crops (Rs/year /ha)		40,000	35, 000	34, 000	27, 000	28, 000	35, 000
	Average income from non agriculture (Rs/year)		-	-	-	-	50, 000	-
Details of the action research	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09

Area under action research (ha)		0.5	0.25	0.25	1.00	0.5	0.5
Type of irrigation technology used		Irrigating pits through narrow interconnec-ted channels.	Irrigating pits through narrow interconnec-ted channels.	Irrigating pits through narrow interconnec-ted channels.	Irrigation through channels	Irrigation through channels	Irrigation through channels
Cost of the irrigation technology used	Capital cost (Rs/ha)	11,000	11,000	11,000	-	-	-
	Life of material	One crop season	One crop season	One crop season	-	-	-
	Operational cost (Rs/ha)	2400	2400	2400	1800	1800	1800
	Labour (Rs/ha)	400	400	400	200	200	200
	Others (Rs/ha)	2000	2000	2000	1600	1600	1600
	Total cost of cultivation (Rs/ha)	55,000	55,000	55,000	30,000	30,000	30,000
	Cost shared by implementing institution (Rs/ha)	31,000	31,000	31,000	6,500	6,500	6,500
	Cost shared by farmer (Rs/ha)	24,000	24,000	24,000	23,500	23,500	23,500
Water used for crop under action research project	Depth of irrigation (cm)	8	8	8	10	10	10
	No. of irrigations	7	7	7	4	4	4
Water used in conventional irrigation	Depth of irrigation (cm)	12	12	14	12	12	12
	No. of irrigations	6	5	6	6	6	6
Type of crop related technology		Ring pit method of planting	Ring pit method of planting	Ring pit method of planting	Irrigation at Critical growth stages	Irrigation at critical growth stages	Irrigation at critical growth stages

Crop yield and income due to	Yield (t/ha)	162	130	140	79	78	75
	Value of the main product	3,64,500	2,92,500	315000	177750	171600	165000
	Value of the by- product	–	–	–	–	–	–
	Yield under conventional irrigation (t/ha)	68	65	68	60	63	60
Number of farmers visiting the action research		100	10	20	6	13	5
Number of farmers willing to adopt technology		7	3	5	3	5	2
Lesson learned from the action research		Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future		Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced		High initial cost & Need more labour	Need more labour	High initial cost & Need more labour	Nil	Nil	Nil
Farmers opinion about implementing research team		Willingness to help in the coming season	Willingness to help in the coming season	Willingness to help in the coming season	Helpful throughout the season	Helpful throughout the season	Helpful throughout the season

Name of State: Uttar Pradesh, District: Barabanki, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 787 mm

Particulars			Name of farmer and village	Avdhesh Kumar (Saidkhanpur)	Atma Prakash Singh (Saidkhanpur)	Bhagvati Prasad (Saidkhanpur)
Details of the farmer/farmers participating in the action research:	Age (years)			42	50	60
	Sex			Male	Male	Male
	Experience in Farming (in years)			22	30	42
	Education			Intermediate	Intermediate	Primary
	Total area owned (ha)	1.5		2.5	2.5	4.0
		-		-		-
	Source of irrigation			Tube well, Canal	Tube well, Canal	Tube well, Canal
	Major crops grown			Sugarcane, paddy, wheat, mentha, mustard	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mustard, mentha
	Knowledge in water management			Poor	Average	Poor
	Average income of the farmer from crops (Rs/year /ha)			28,000	35,000	28,000
	Average income from non agriculture (Rs/year)			50,000	-	35,000
Details of the action research	Soil Type			Sandy loam	Sandy loam	Sandy loam
	Name of the crop			Sugarcane	Sugarcane,	Sugarcane,
	Season			Spring '09	Spring '09	Spring '09
	Area under action research (ha)			0.5	0.5	1.0
	Type of irrigation technology used			Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Flood Method
	Cost of the irrigation technology used	Capital cost (Rs/ha)		1200	1900	1900
		Life of material		One crop season	One crop season	One crop season
		Operational cost (Rs/ha)		1400	2000	2000
		Labour (Rs/ha)		200	300	300
		Others (Rs/ha)		1200	1700	1700
		Total cost of cultivation (Rs/ha)		30,000	28,000	28,000
		Cost shared by implementing institution (Rs/ha)		10,000	11,500	11,500
		Cost shared by farmer (Rs/ha)		20,000	16, 500	16, 500

	Water used for crop under action research project	Depth of irrigation (cm)	10	10	10
		No. of irrigations	5	5	5
	Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12
		No. of irrigations	6	6	6
	Type of crop related technology		Skip furrow method of irrigation	Skip furrow method of irrigation	Trash mulching
Crop yield and income	Yield (t/ha)		76	77	65
	Value of the main product		1,71,000	1,73, 250	1,43,000
	Value of the by- product		-	-	-
	Yield under conventional irrigation (t/ha)		65	63	60
Number of farmers visiting the action research			14	5	7
Number of farmers willing to adopt technology			6	3	7
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future
Constraints faced			Nil	Nil	Nil
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

Name of State: Uttar Pradesh, District: Barabanki, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 787 mm

Particulars	Name of farmer and village		Neelam (Udvatnagar)	Dhanpal Singh (Udvatnagar)	Mahendra Pratap Singh (Udvatnagar)	Rupesh Kumar (Udvatnagar)
Details of the farmer/farmers participating in the action research:	Age (years)		45	70	65	27
	Sex		Female	Male	Male	Male
	Experience in Farming (in years)		20	50	40	10
	Education		High school	High school	High School	Post Graduate
	Total area owned (ha)	Irrigated	2.0	10.0	3.0	3.5
		Dryland	-	-	-	-
	Source of irrigation		Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal
	Major crops grown		Sugarcane, wheat, paddy, mentha, mustard	Sugarcane, wheat, paddy, mustard	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mustard, mentha
	Knowledge in water management		Poor	Average	Average	Poor
	Average income of the farmer from crops (Rs/year /ha)		26,000	30, 000	26, 000	26, 000
	Average income from non agriculture (Rs/year)		-	26,000	75,000	-
Details of the action research	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '09	Spring '09	Spring '09	Spring '09
	Area under action research (ha)		1.0	1.0	0.5	0.5
	Type of irrigation technology used		Flood Method	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows
	Cost of the irrigation technology used	Capital cost (Rs/ha)	1900	1200	1200	1200
		Life of material	One crop season	One crop season	One crop season	One crop season
		Operational cost (Rs/ha)	2000	1400	1400	1400
		Labour (Rs/ha)	300	200	200	200
		Others (Rs/ha)	1700	1200	1200	1200
		Total cost of cultivation (Rs/ha)	28,000	30,000	30,000	30,000

		Cost shared by implementing institution (Rs/ha)	11,500	10,000	10,000	10,000
		Cost shared by farmer (Rs/ha)	16, 500	20,000	20,000	20,000
	Water used for crop under action research project	Depth of irrigation (cm)	10	10	10	10
		No. of irrigations	5	6	6	6
	Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12	12
		No. of irrigations	6	6	6	6
	Type of crop related technology		Trash mulching	Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation
Crop yield and income due to	Yield (t/ha)		72	72	73	76
	Value of the main product		162000	162000	160600	167200
	Value of the by- product		3000	-	-	-
	Yield under conventional irrigation (t/ha)		65	60	62	64
Number of farmers visiting the action research			5	4	3	7
Number of farmers willing to adopt technology			4	3	3	5
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced			Nil	Nil	Nil	Nil
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

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Average annual rainfall of the location: 787 mm

Particulars			Name of farmer and village	Saroj Singh (Garhi Satrahi)	Mata Badal Sinhg (Garhi Satrahi)	Tej Bahadur Singh (Garhi Satrahi)
Details of the farmer/farmers participating in the action research			Age (years)	32	35	65
			Sex	Female	Male	Male
			Experience in Farming (in years)	11	18	42
			Education	High school	Inter mediate	Graduate
			Total area owned (ha) Irrigated	3.0	7.5	3.0
			Total area owned (ha) Dryland	-	-	-
			Source of irrigation	Tube well, Canal	Tube well, Canal	Canal
			Major crops grown	Sugarcane, wheat, paddy, mentha, mustard	Sugarcane, wheat, paddy, mentha, mustard	Sugarcane, wheat, paddy, mustard
			Knowledge in water management	Average	Average	Average
			Average income of the farmer from crops (Rs/year /ha)	28,000	30,000	30, 000
			Average income from non agriculture (Rs/year)	-	-	10,000
Details of the action research			Soil Type	Sandy loam	Sandy loam	Sandy loam
			Name of the crop	Sugarcane	Sugarcane	Sugarcane
			Season	Spring '09	Spring '09	Spring '09
			Area under action research (ha)	1.0	1.0	1.0
			Type of irrigation technology used	Flood Method	Flood Method	Irrigation through furrows made in alternate rows
	Cost of the irrigation technology used		Capital cost (Rs/ha)	1900	1900	1200
			Life of material	One crop season	One crop season	One crop season
			Operational cost (Rs/ha)	2000	2000	1400
			Labour (Rs/ha)	300	300	200
			Others (Rs/ha)	1700	1700	1200
			Total cost of cultivation (Rs/ha)	28,000	28,000	30,000
			Cost shared by implementing institution (Rs/ha)	11,500	11,500	10,000
			Cost shared by farmer (Rs/ha)	16, 500	16, 500	20,000

	Water used for crop under action research project	Depth of irrigation (cm)	10	10	10
		No. of irrigations	5	5	6
	Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12
		No. of irrigations	6	6	6
	Type of crop related technology		Trash mulching	Trash mulching	Skip furrow method of irrigation
Crop yield and income	Yield (t/ha)		70	75	65
	Value of the main product		154000	165000	143000
	Value of the by- product				
	Yield under conventional irrigation (t/ha)		60	60	55
Number of farmers visiting the action research			6	7	7
Number of farmers willing to adopt technology			5	3	5
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future
Constraints faced			Nil	Need more labour	Nil
Farmers opinion about implementing research team			Knowledgeable and helpful	Knowledgeable and helpful	Knowledgeable and helpful

Name of State: Uttar Pradesh, District: Barabanki, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 787 mm

Particulars		Name of farmer and village	Santi Devi (Bijapur)	Raj Kumari (Bijapur)	Surendra Bahadur (Bijapur)	Rajendra Bahadur Singh (Bijapur)	Indrajjt Singh (Bijapur)	Ramdin Pal (Bijapur)	Sankar Bax Singh (Bijapur)	Sitapati (Bijapur)
Details of the farmer/farmers participating in the action research:	Age (years)		60	53	48	40	57	40	50	52
	Sex		Female	Female	Male	Male	Male	Male	Male	Female
	Experience in Farming (in years)		35	25	30	16	35	20	30	30
	Education		Illiterate	Illiterate	Illiterate	High school	High school	High school	High school	Illiterate
	Total area owned (ha)	Irrigated	1.5	1.0	0.75	1.0	1.5	0.75	1.5	1.0
		Dryland	-	-	-	-	-	-	-	-
	Source of irrigation		Tube well	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal
	Major crops grown		Sugarcane, wheat, paddy, mentha	Sugarcane, wheat, Lentil, mentha, mustard	Sugarcane, paddy, wheat, mustard, arhar	Sugarcane, paddy, wheat, mustard, lentil	Sugarcane, paddy, wheat, mentha	Sugarcane, paddy, wheat, mustard, arhar	Sugarcane, paddy, wheat, mustard, lentil	Sugarcane, wheat, mustard, mentha
	Knowledge in water management		Average	Poor	Average	Average	Average	Poor	Average	Poor
	Average income of the farmer from crops (Rs/year /ha)		26,000	22, 000	27, 000	26,500	28, 000	24,500	25,000	25,000
	Average income from non agriculture (Rs/year)		-	-	-	-	-	-	-	-
Details of the action research	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09	Spring '09

Area under action research (ha)		1.00	0.5	0.25	0.25	0.5	0.5	1.00	1.00
Type of irrigation technology used		Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through channels	Irrigation through channels	Irrigation through channels	Flood method
Cost of the irrigation technology used	Capital cost (Rs/ha)	1200	1200	1200	1200	-	-	-	1900
	Life of material	One crop season	One crop season	One crop season	One crop season	-	-	-	One crop season
	Operational cost (Rs/ha)	1400	1400	1400	1400	1800	1800	1800	2000
	Labour (Rs/ha)	200	200	200	200	200	200	200	300
	Others (Rs/ha)	1200	1200	1200	1200	1600	1600	1600	1700
	Total cost of cultivation (Rs/ha)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	28,000
	Cost shared by implementing institution (Rs/ha)	10,000	10,000	10,000	10,000	6,500	6,500	6,500	11,500
	Cost shared by farmer (Rs/ha)	20,000	20,000	20,000	20,000	23,500	23,500	23,500	16, 500
Water used for crop under action research project	Depth of irrigation (cm)	10	10	10	10	10	10	10	10
	No. of irrigations	6	6	6	6	4	4	4	5

	Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12	12	12	12	12	12
		No. of irrigations	6	6	6	6	6	6	6	6
	Type of crop related technology		Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation	Irrigation at Critical growth stages	Irrigation at Critical growth stages	Irrigation at Critical growth stages	Trash mulching
Crop yield and income	Yield (t/ha)		75	65	80	95	90	90	80	80
	Value of the main product		165000	143000	176000	209000	198000	198000	176000	176000
	Value of the by- product		-	-	-	-	-	-	-	-
	Yield under conventional irrigation (t/ha)		62	60	60	64	65	65	63	60
Number of farmer visiting the action research			5	6	8	5	6	4	4	10
Number of farmers willing to adopt technology			4	5	4	2	4	2	3	4
Lesson learned from the action research			Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new techno-logy	Learned the new techno-logy	Learned the new techno-logy	Learned the new technology
Follow-up in future			Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced			Nil	Need more labour	Nil	Nil	Nil	Nil	Nil	Nil
Farmers opinion about implementing research team			Knowled-geable and helpful	Knowled-geable and helpful	Knowled-geable and helpful	Knowled-geable and helpful	Knowled-geable and helpful	Knowled-geable and helpful	Knowled-geable and helpful	Knowled-geable and helpful

Village wise data for FPARP Evaluation (2010-11)

Annexure-VI

Name of State: Uttar Pradesh, District: Sitapur, Agro climatic zone: Upper Gangetic Plain Region
Average annual rainfall of the location: 780 mm

Particulars			Name of farmer and village	Layeek Khan (Kaimhara)	Iqbal Ahmad (Maijuddinpur)	Ram Chandra Verma (Tikra)	Maya Devi (Tikra)	Banke Lal (Shankarpur)
Details of the farmer/farmers participating in the action research:	Age (year)			38	52	64	42	68
	Sex			Male	Male	Male	Female	Male
	Experience in Farming (in years)			15	30	40	15	35
	Education			High Shool	High Shool	Intermediate	Eighth	Fifth
	Total area owned (ha)	Irrigated		2.16	0.8	4.8	1.4	3.24
		Dryland		-	-	-	-	0.5
	Source of irrigation			Tube well	Tube well	Tube well	Tube well	Tube well, Canal
	Major crops grown			Sugarcane, paddy, wheat, lentil, mustard	Sugarcane, paddy, wheat, lenti, urd, mustard	Sugarcane, wheat, potato, mustard, paddy, Urd, Mentha	Sugarcane, mustard, potato, paddy, wheat	Sugarcane, mustard, paddy, wheat, lentil
	Knowledge in water management			Good	Average	Average	Poor	Average
	Average income of the farmer from crops (Rs/year /ha)			40, 000	25, 000	40,000	36, 000	35, 000
	Average income from non agriculture (Rs/year)			38,000	1, 20,000	-	-	-
Details of the action	Soil Type			Loam	Loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop			Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane

Season of planting		Spring '10	Spring '10	Spring '10	Spring '10	Spring '10
Area under action research (ha)		1	1	1	1	1
Type of irrigation technology used		Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows
Cost of irrigation tech. used	Capital cost (Rs/ha)	1200	1200	1200	1200	1200
	Life of material	One crop season	One crop season	One crop season	One crop season	One crop season
	Operational cost (Rs/ha)	1400	1400	1400	1400	1400
	Labour (Rs/ha)	200	200	200	200	200
	Others (Rs/ha)	1200	1200	1200	1200	1200
	Total cost of cultivation (Rs/ha)	30,000	30,000	30,000	30,000	30,000
	Cost shared by implementing institution (Rs/ha)	10,000	10,000	10,000	10,000	10,000
	Cost shared by farmer (Rs/ha)	20,000	20,000	20,000	20,000	20,000
Water used for crop under action research project	Depth of irrigation (cm)	10	10	10	10	10
	No. of irrigations	6	6	6	6	6
Water used in conventional irrigation	Depth of irrigation (cm)	12	13	12	12	12
	No. of irrigations	6	6	6	6	6

	Type of crop related technology	Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation
Crop yield & income due to action research	Yield (t/ha)	94	75	159	158	97
	Value of the main product	1, 97, 400	1, 53, 750	3, 33, 900	3,31,800	2,03,700
	Value of the by- product	-	-	-	-	-
	Yield under conventional irrigation (t/ha)	70	62	70	73	70
Number of farmers visiting the action research		7	10	200	7	10
Number of farmers willing to adopt technology		5	4	50	5	6
Lesson learned from the action research		water saving by applying water in skip furrows	water saving by applying water in skip furrows	water saving by applying water in skip furrows	water saving by applying water in skip furrows	water saving by applying water in skip furrows
Follow-up in future		Will continue this practice in future	will continue this practice in future	will continue this practice in future	will continue this practice in future	will continue this practice in future
Constraints faced		nil	nil	nil	nil	nil
Farmer's opinion about implementing research team		Knowledgeable and helpful throughout crop season	Knowledgeable and helpful throughout crop season	Knowledgeable and helpful throughout crop season	Knowledgeable and helpful throughout crop season	Knowledgeable and helpful throughout crop season

Name of State: Uttar Pradesh, District: Sitapur, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 780 mm

	Particulars / Name of farmer and village		Savitri Devi (Maizuddin-pur)	Shamad Khan (Bakhariya)	Samun Khan (Parse-hara)	Trimohan Lal (Majhig-awan)	Surya Prasad (Benwariha)	Malti Devi (Benwa-riha)	Ramsewak Verma (Ramkund)	Ramesh Babu (Harsingh-pur)
Details of the farmer/farmers participating in the action research:	Age (years)		61	35	56	48	53	50	55	47
	Sex		Female	Male	Male	Male	Male	Female	Male	Male
	Experience in Farming (in years)		30	11	30	18	28	17	25	18
	Education		Illiterate	Inter-mediate	Eighth	Graduate	Eighth	Illiterate	Post graduate	Graduate
	Total area owned (ha)	Irrigated	1.64	3.66	2.74	2.4	3.2	1.0	2.5	2.80
		Dry land	-	0.5	-	-	0.5	-	-	-
	Source of irrigation		Tube well	Tube well, Pump set	Tube well	Tube well	Tube well	Tube well	Tube well, Canal	Tube well
	Major crops grown		Sugarcane, wheat, paddy, mustard	Sugarcane, wheat, paddy, mustard, lentil	Sugarcane, paddy, wheat	Sugarcane, paddy, wheat, mustard, Potato, lentil, onion, garlic	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mustard, lentil, mentha	Sugarcane, Paddy, wheat, lentil	Sugarcane, paddy, wheat, lentil
	Knowledge in water management		Average	Good	Good	Average	Average	Good	Good	Average
	Average income of the farmer from crops (Rs/year /ha)		30,000	35, 000	34, 000	40, 000	40, 000	36, 000	46,000	35,000
	Average income from non agriculture (Rs/year)		36,000	75,000	36,000	-	36,000	36, 000	72, 000	2,40,000
Details of	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane

Season		Spring '10	Spring '10	Spring '10	Spring '10	Spring '10	Spring '10	Spring 10	Spring '10
Area under action research (ha)		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Type of irrigation technology used		Irrigation through channels	Irrigation through channels	Irrigation through channels	Irrigation through channels	Flood Method	Flood Method	Flood Method	Flood Method
Cost of the irrigation technology used	Capital cost (Rs/ha)	-	-	-	-	1900	1900	1900	1900
	Life of material	-	-	-	-	One crop season	One crop season	One crop season	One crop season
	Operational cost (Rs/ha)	1800	1800	1800	1800	2000	2000	2000	2000
	Labour (Rs/ha)	200	200	200	200	300	300	300	300
	Others (Rs/ha)	1600	1600	1600	1600	1700	1700	1700	1700
	Total cost of cultivation (Rs/ha)	30,000	30,000	30,000	30,000	28,000	28,000	28,000	28,000
	Cost shared by implementing institution (Rs/ha)	6,500	6,500	6,500	6,500	11,500	11,500	11,500	11,500
	Cost shared by farmer (Rs/ha)	23,500	23,500	23,500	23,500	16, 500	16, 500	16, 500	16, 500
Water used for crop under action research project	Depth of irrigation (cm)	10	10	10	10	10	10	10	10
	No. of irrigations	4	4	4	4	5	5	5	5
Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12	12	12	12	12	12
	No. of irrigations	6	6	6	6	5	5	5	5
Type of crop related technology		Irrigation at critical growth stages	Irrigation at critical growth stages	Irrigation at critical growth stages	Irrigation at critical growth stages	Trash Mulching	Trash Mulching	Trash Mulching	Trash Mulching

Crop yield and income	Yield (t/ha)	75	82.5	82	82	75	75	75	94
	Value of the main product	1,53,750	1,73,250	1,68,100	1,68,100	1,57,500	1,53,750	1,57,500	1,92,700
	Value of the by- product	-	-	-	-	-	-	-	-
	Yield under conventional irrigation (t/ha)	65	72	70	72	64	63	67	78
Number of farmers visiting the action research		6	7	8	4	7	7	10	9
Number of farmers willing to adopt technology		4	4	5	4	5	4	4	5
Lesson learned from the action research		water saving by applying water at critical growth stages only	water saving by applying water at critical growth stages only	water saving by applying water at critical growth stages only	water saving by applying water at critical growth stages only	Trash mulch in the field to save water	Trash mulch in the field to save water	Trash mulch in the field to save water	Trash mulch in the field to save water
Follow-up in future		Will continue this practice in future	Will continue this practice in future	Will continue in future	Will continue this practice in future	Will continue to mulch trash in ratoon crop	Will continue to mulch trash in ratoon crop	Will continue to mulch trash in ratoon crop	continue to mulch trash in ratoon crop
Constraints faced		nil	nil	nil	nil	More labour required for collection and spreading of trash	More labour required for collection and spreading of trash	More labour required for collection and spreading of trash	More labour required for collection and spreading of trash
Farmers opinion about implementing research team		Co-operative and knowledgeable	Co-operative and knowled-geable	coopera-tive and receptive	cooperative and receptive	cooperative and receptive	cooperative and receptive	cooperative and receptive	coopera-tive and receptive

Name of State–Uttar Pradesh, Name of District- Sitapur, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall-780 mm

Particulars			Name of farmer and village	Adityanath (Bhagwanpur-Janua)	Ram Prasad (Benwariha)	Pradip Singh Chauhan (Devipur)
Details of the farmer/farmers participating in the action research:	Age (years)			54	56	45
	Sex			Male	Male	Male
	Experience in Farming (in years)			25	22	22
	Education			Graduate	Intermediate	Graduate
	Total area owned (ha)	Irrigated		8.0	1.6	4.0
		Dryland		-	-	-
	Source of irrigation			Tube well, Pump set ,Canal	Tube well, Pump set	Tube well, canal
	Major crops grown			Sugarcane, wheat, paddy, lentil, mustard	Sugarcane, wheat, paddy, lentil, mustard	Sugarcane, paddy, wheat, mustard, potato
	Knowledge in water management			Good	Good	Good
	Average income of the farmer from crops (Rs/year /ha)			35,000	35, 000	42, 000
	Average income from non agriculture (Rs/year)			2,00,000	-	-
Details of the action research	Soil Type			Sandy loam	Sandy loam	Sandy loam
	Name of the crop			Sugarcane	Sugarcane	Sugarcane
	Season			Spring 10	Spring '10	Spring 10
	Area under action research (ha)			1.00	1.00	1.00
	Type of irrigation technology used			Flood Method	Flood Method	Flood Method
	Cost of the irrigation technology used	Capital cost (Rs/ha)		1900	1900	1900
		Life of material		One crop season	One crop season	One crop season
		Operational cost (Rs/ha)		2000	2000	2000
		Labour (Rs/ha)		300	300	300
		Others (Rs/ha)		1700	1700	1700
		Total cost of cultivation (Rs/ha)		28,000	28,000	28,000

		Cost shared by implementing institution (Rs/ha)	11,500	11,500	11,500
		Cost shared by farmer (Rs/ha)	16, 500	16, 500	16, 500
	Water used for crop under action research project	Depth of irrigation (cm)	10	10	10
		No. of irrigations	5	5	5
	Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12
		No. of irrigations	5	5	5
	Type of crop related technology		Trash mulching	Trash mulching	Trash mulching
Crop yield and income	Yield (t/ha)		75	75	78
	Value of the main product		1,53,750	1,57,500	1,63,800
	Value of the by- product		-	-	-
	Yield under conventional irrigation (t/ha)		68	63	70
Number of farmers visiting the action research			10	8	12
Number of farmers willing to adopt technology			4	4	7
Lesson learned from the action research			Trash mulch in the field to save water	Trash mulch in the field to save water	Trash mulch in the field to save water
Follow-up in future			Will continue to mulch trash in ratoon crop	Will continue to mulch trash in ratoon crop	Will continue to mulch trash in ratoon crop
Constraints faced			More labour required for collection and spreading of trash	More labour required for collection and spreading of trash	More labour required for collection and spreading of trash
Farmers opinion about implementing research team			Cooperative and receptive	Cooperative and receptive	Cooperative and receptive

Name of State: Uttar Pradesh, District: Barabanki, Agro climatic zone : Upper Gangetic Plain Region
Average annual rainfall of the location: 787 mm

Particulars		Name of farmer and village	Madanlal (Utwan)	Radhey Shaym (Vir Ki Thanyee)	Ram Avtar (Akbarpur)	Lila Singh (Said-khanpur)	Rampal (Gangauli)	Birendra Bahadur Singh (Dhamapur)	Sidhdhanath (Sisauna)
Details of the farmer/farmers participating in the action research:	Age (years)		40	55	55	50	60	45	60
	Sex		Male	Male	Male	Male	Male	Male	Male
	Experience in Farming (in years)		20	30	30	30	35	25	35
	Education		Intermediate	Middle	Middle	Middle	High school	Degree	Intermediate
	Total area owned (ha)	Irrigated	1.5	3.0	4.0	1.5	4.0	3.0	2.5
		Dryland	-	-	-		-	-	-
	Source of irrigation		Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well, Canal
	Major crops grown		Sugarcane, wheat, paddy, mentha, mustard	Sugarcane, wheat, paddy, mentha	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, wheat, mustard, mentha	Sugarcane, paddy, mustard , wheat, mentha	Sugarcane, paddy, wheat, mentha
	Knowledge in water management		Average	Average	Average	Average	Poor	Average	Average
	Average income of the farmer from crops (Rs/year /ha)		35,000	32, 000	36, 000	38, 000	39, 000	42, 000	30, 000
	Average income from non agriculture (Rs/year)		-	-	-	-	-	-	72, 000
Details of the action research	Soil Type		Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '10	Spring '10	Spring '10	Spring '10	Spring '10	Spring '10	Autumn'09
	Area under action research (ha)		0.5	0.5	0.5	0.5	1.0	1.0	1.0

Type of irrigation technology used		Flood method	Flood method	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Flood Method	Flood Method	Irrigating pits through narrow inter-connecting channels.
Cost of the irrigation technology used	Capital cost (Rs/ha)	1900	1900	1200	1200	-	-	11,000
	Life of material	One crop season	One crop season	One crop season	One crop season	-	-	One crop season
	Operational cost (Rs/ha)	2000	2000	1400	1400	1800	1800	2400
	Labour (Rs/ha)	300	300	200	200	200	200	400
	Others (Rs/ha)	1700	1700	1200	1200	1600	1600	2000
	Total cost of cultivation (Rs/ha)	28,000	28,000	30,000	30,000	30,000	30,000	55,000
	Cost shared by implementing institution (Rs/ha)	11,500	11,500	10,000	10,000	6,500	6,500	31,000
	Cost shared by farmer (Rs/ha)	16, 500	16, 500	20,000	20,000	23,500	23,500	24,000
Water used for crop under action research project	Depth of irrigation (cm)	12	12	10	10	14	14	8
	No. of irrigations	5	5	5	4	4	4	7
Water used in conventional irrigation	Depth of irrigation (cm)	12	12	12	12	14	14	15
	No. of irrigations	6	6	6	6	6	6	6
Type of crop related technology		Trash mulching	Trash mulching	Skip furrow Method of Irrigation	Skip furrow Method of Irrigation	Irrigation at critical growth stages	Irrigation at critical growth stages	Ring pit method of planting

Crop yield and income due to	Yield (t/ha)	70	70	75	70	70	75	130
	Value of the main product	1, 40, 000	1, 43, 500	1, 50, 000	1, 43, 500	1, 43, 500	1, 53, 750	2, 73, 000
	Value of the by- product	--	--	--	--	--	--	-
	Yield under conventional irrigation (t/ha)	55	56	58	55	60	58	62
Number of farmers visiting the action research		11	20	25	15	14	150	150
Number of farmers willing to adopt technology		8	10	10	6	10	50	10
Lesson learned from the action research		Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology, Obtained more yield by cane planting in pits
Follow-up in future		Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced		High initial cost & Need more labour	Need more labour	High initial cost & Need more labour	Nil	Nil	Nil	High initial cost & Need more labour
Farmers opinion about implementing research team		Have good knowledge about the technology, Willingness to help in the coming season	Willingness to help in the coming season & Helpful throughout the season	Willingness to help in the coming season	Helpful through-out the season	Helpful through-out the season	Helpful throughout the season	Helpful throughout the season

Particulars		Name of farmer and village	Rampher Shukla (Budhnapur)	Ram Milan Yadav (Kanwa)	Rajesh Kumar Singh (Kanwa)	Raj Kumar Singh (Kanwa)	Brajendra Pal Singh (Kanwa)	Kuwanr Singh Kachhwah (Balwapur)
Details of the farmer/farmers participating in the action research:	Age (years)		55	40	42	45	65	55
	Sex		Male	Male	Male	Male	Male	Male
	Experience in Farming (in years)		35	20	22	25	42	35
	Education		Graduate	Middle	Intermediate	Intermediate	High school	High school
	Total area owned (ha)	Irrigated	1.6	1.5	3.5	3.5	5.0	3.0
		Dryland	-	-	-	-	-	-
	Source of irrigation		Tube well	Tube well, Canal	Tube well, Canal	Tube well, Canal	Tube well,	Tube well,
	Major crops grown		Sugarcane, wheat, paddy, mentha	Sugarcane, wheat, Lentil, mentha, mustard	Sugarcane, paddy, wheat, mustard, Corriander, arhar	Sugarcane, paddy, wheat, mustard, lentil	Sugarcane, paddy, wheat, mentha	Sugarcane, paddy, wheat, mustard, arhar
	Knowledge in water management		Average	Average	Average	Average	Average	Good
	Average income of the farmer from crops (Rs/year /ha)		28, 000	30, 000	36, 000	37, 500	34, 000	40, 000
	Average income from non agriculture (Rs/year)		-	-	-	-	-	-
Details of the action	Soil Type		Clay loam	Clay loam	Clay loam	Clay loam	Clay loam	Sandy loam
	Name of the crop		Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane	Sugarcane
	Season		Spring '10	Spring '10	Spring '10	Spring '10	Spring '10	Spring '10
	Area under action research a)		1.00	0.5	0.5	1.0	0.5	0.5

Type of irrigation technology used		Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Irrigation through furrows made in alternate rows	Flood Method	Flood Method	Flood Method
Cost of the irrigation technology used	Capital cost (Rs/ha)	1200	1200	1200	-	-	-
	Life of material	One crop season	One crop season	One crop season	-	-	-
	Operational cost (Rs/ha)	1400	1400	1400	1800	1800	1800
	Labour (Rs/ha)	200	200	200	200	200	200
	Others (Rs/ha)	1200	1200	1200	1600	1600	1600
	Total cost of cultivation (Rs/ha)	30,000	30,000	30,000	30,000	30,000	30,000
	Cost shared by implementing institution (Rs/ha)	10,000	10,000	10,000	6,500	6,500	6,500
	Cost shared by farmer (Rs/ha)	20,000	20,000	20,000	23,500	23,500	23,500
Water used for crop under action research project	Depth of irrigation (cm)	10	12	10	14	14	14
	No. of irrigations	6	5	5	4	4	4
Water used in conventional irrigation	Depth of irrigation (cm)	12	14	14	14	14	14
	No. of irrigations	6	5	5	6	6	6

	Type of crop related technology	Skip furrow method of irrigation	Skip furrow method of irrigation	Skip furrow method of irrigation	Irrigation at Critical growth stages	Irrigation at Critical growth stages	Irrigation at Critical growth stages
Crop yield and income	Yield (t/ha)	70	72	65	62	65	65
	Value of the main product	1, 40, 000	1, 44, 000	1, 30, 000	1, 24, 000	1, 30, 000	1, 30, 000
	Value of the by- product	-	-	-	-	-	-
	Yield under conventional irrigation (t/ha)	55	62	52	55	50	54
Number of farmer visiting the action research		12	15	20	15	21	25
Number of farmers willing to adopt technology		7	6	11	7	13	12
Lesson learned from the action research		Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology	Learned the new technology
Follow-up in future		Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future	Will follow in future
Constraints faced		Nil	Need more labour	Nil	Nil	Nil	Nil
Farmers opinion about implementing research team		Knowledge-able and helpful	Knowledge-able and helpful	Knowledge-able and helpful	Knowledge-able and helpful	Knowledge-able and helpful	Knowledgeable and helpful

60th Year of Dedicated Service to the Nation...

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