



Potential of Water Saving Technology

Water is a precious natural resource, vital for sustaining all life on the earth and critical input for sustainable development. Water as a resource requires special attention due to its multiple uses and the problems created by its excesses, shortages and quality deterioration. From a per capita annual average of 5,177 cubic meters in 1951, fresh water availability in India dropped to 1,820 cubic meters in 2001, almost reaching the water stress level. In fact, it is predicted that by 2025, per capita annual average fresh water availability will be 1,340 cubic meters approximately. Already, the potential of most river basins is being exploited beyond 50 per cent and several basins are considered to be water scarce. Over 80 per cent of the domestic water supply in India is dependent on groundwater. However, groundwater is fast depleting. Water tables have fallen significantly in most areas and there is a significant pollution of groundwater from natural as well as manmade sources. Agriculture receives the greater share of the annual water allocation in India. According to the Union Ministry of Water Resources (MoWR), 80 per cent of India's utilizable water is devoted to this sector, mostly in the form of irrigation. The industrial sector is the second highest user of water (6% of total fresh water withdrawals) after agriculture. Demand from the domestic sector has remained low and accounts for only 5 per cent of the annual freshwater withdrawals in India. The per capita availability of water is decreasing year after year due to climate change and increasing population. As the water availability is declining alarmingly, the enhancement of the water use efficiency and water productivity in agriculture is particularly important, as this activity is the leading consumer of the water.

Sugarcane is one of the important cash crops of India. Over 45 million farmers are involved in sugarcane cultivation and about 7.5 per cent rural population directly or indirectly is dependent on the sugar industry. Sugarcane being one year crop, it has to survive through all the seasons of the year. Formative phase of the crop, in which the crop is young and tender, coincides with hot and desiccating summer. For this reason, optimum soil moisture in the formative phase of the sugarcane crop is most important to have the good yield of the crop. Water requirement of sugarcane is 1500–2500 mm/year depending upon soil, climate and crop conditions. Majority of the farmers irrigate sugarcane crop unscientifically by using surface irrigation methods and therefore, irrigation efficiency at farmers' fields seldom exceeds 35-45 per cent. Therefore, there is a need to improve irrigation efficiency at the farmers' fields to

save the most precious natural resource i.e. water. Scientists have worked to enhance irrigation water use efficiency by 1.5 to 2.5 times through devising advance irrigation methods or modifying existing surface irrigation methods.

It is generally accepted that adoption of scientific irrigation by farmers is far below expectations and farmers need more comprehensive technological support that is simpler to use, and can be integrated into farm management. Non-adoption of irrigation water saving techniques by the farmers, leads to over irrigation, low water use efficiency and reduced profitability. The complexity of technology, the difficulty of applying it in practice on the farm and the perception that accurate irrigation scheduling provides a little benefit, are the most frequently cited reasons for non-adoption. The challenge, therefore, is to provide useful practical advice to the farmers and to convince them about benefits of irrigation water saving technologies by on-farm demonstrations. In this regard, demonstrations of water saving sugarcane production technologies were laid out at the farmers' fields in Sitapur and Barabanki districts of Uttar Pradesh under Farmers' Participatory Action Research Programme (FPARP) funded by the Ministry of Water Resources, Government of India. A total of 35 demonstrations on four selected technologies viz., Skip furrow method of irrigation, Irrigation at critical growth stages, ring-pit method of planting and trash mulching were conducted during crop season 2008-09 at the selected farmers' fields. The on-farm assessment of demonstrated technologies revealed significant increase in crop yield, irrigation water saving and irrigation water use efficiency. In comparison with conventional method/farmers' practice of irrigation, there was 30% increase in cane yield, 31.21% saving in irrigation water with corresponding increase of 70.6% in irrigation water use efficiency in the skip furrow method of irrigation. In case of ring-pit method of planting, there was 40.70% increase in cane yield, 38.52% water saving and 128.9% increase in irrigation water use efficiency. In trash mulching technology, 38.2% increase in yield, 28.7% saving in irrigation water and 93.9% increase in irrigation water use efficiency was recorded. Irrigation at Critical Growth Stages resulted in 16.81% water saving and 30.6% increase in yield and 57% increase in irrigation water use efficiency.

The highest net return (Rs.63254/ha) was recorded in case of trash mulching followed by skip furrow method of irrigation (Rs.61089/ha), irrigation at critical growth stages (Rs.57130/ha) and ring pit method of planting (Rs.49863/ha).



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The highest B/C ratio was observed with trash mulching (2.47) followed by skip furrow method of irrigation (2.11), irrigation at critical growth stages (1.97) and ring-pit method of planting (1.57). The results derived clearly established the fact that water saving sugarcane production technologies are beneficial in saving most precious natural resource i.e. irrigation water vis-à-vis also increased farmers' income from sugarcane cultivation.

Group Meeting of AICRP on Sugarcane

The Group Meeting of AICRP on Sugarcane was held at the Rajendra Agricultural University (RAU), Pusa, Samastipur (Bihar) from 6-8 November, 2009. The meeting was inaugurated by Dr. M.L. Chaudhary, Vice-Chancellor, RAU, Pusa. Dr. Chaudhary, in his inaugural speech urged the professionals to opt community and mission mode approach of technology transfer for adoption of proven sugarcane technologies by the farmers. He laid emphasis on making available certified quality seed material to the farmers. He was also of the view that problem of water-logging and drought should be addressed appropriately. Dr. K.C. Jain, Asstt. Director General (CC), ICAR, New Delhi chaired the inaugural session and Dr. B.C. Choudhary, Director of Research, RAU, Pusa welcomed the delegates. Dr. O.K. Sinha, Project Coordinator (Sugarcane) presented the salient achievements of AICRP for the year 2008-09. Dr. R.L. Yadav, Director, IISR, Lucknow, in his introductory remarks, stated that sugarcane production in the country is in critical stage. Major reasons for decline in cane production are the low price of sugarcane and delay in payment to growers by sugar mills. He suggested that about 50% of the anticipated cost of cane may be given to growers at planting time and the rest after supply to mills. He urged for announcement of cane price well before planting. Dr. N. Vijayan Nair, Director, Sugarcane Breeding Institute, Coimbatore stated that the then Indian Agricultural Research Institute, Pusa introduced excellent sugarcane varieties and new cultivation practices. He pointed out that current decline in sugarcane production is not due to lack of technology, but due to shifting of sugarcane area to other remunerative crops. He emphasized to address the problems arising due to climate change.

Dr. K.C. Jain remarked that over the years, cyclic process of low and high cane and sugar production has been observed. The problems in sugarcane cultivation are natural as well as man-made. For addressing the natural problems like drought, water-logging and insect-pests & diseases, improved technologies should be developed. Man-made problems like delay in payment, labour shortage, and non-availability of inputs can be resolved by practice of appropriate management. The Varietal Identification Committee meeting was held under the chairmanship of Dr. K.C. Jain, ADG (CC). Eight varieties viz., Co 0239 (Karan-6) in early group and Co 0124 (Karan-5) in mid-late group for North West Zone; CoSe 01421 (Imarti) in early group and BO 146 in mid-late group for North Central and North Eastern Zones; Co 0314 (Shyamala) in early group and Co 0218 (Shreyas) in mid-late group for Peninsular Zone; and CoOr 03151 (Sabita) and CoA 03081 in early group for East Coast Zone were identified for release. The Joint Technical Session on Review of Frontline Demonstrations and Breeder Seed Production Programme under Macro Management Scheme of DAC, Min. of Agriculture, Govt. of India was held under the chairmanship of Dr. V.S. Verma, Dean (Agriculture), RAU, Pusa. The development of high sucrose varieties with tolerance to drought and water-logging was emphasized in the Plenary Session.

Zonal Breeders' Meet of Peninsular and East Coast Zone

The Zonal Breeders' Meet was held at the Sugarcane Breeding Institute, Coimbatore on 24 November, 2009 to finalize the technical programme of Crop Improvement discipline. The meeting was chaired by Dr. N. Vijayan Nair, Director, Sugarcane Breeding Institute, Coimbatore. Breeders from the AICRP centers in Peninsular and East Coast Zones participated in the meeting. The Chairman reviewed the

crossing work being performed at NHG. The zonal entries of IVT-early and mid-late (2009-10) were short-listed based on their growth performance and disease reaction and promoted to Advance Varietal Trial.

Sugarcane clones & genotype accepted for Evaluation

Three early maturing clones LG 01030, LG 05031 and LG 03702 and, one mid-late genotype LG 04043 have been accepted for evaluation under AICRP (S) for North West zone.

Primers specific to red rot disease developed

A total of 67 EST-SSR primers from subtractive cDNA library specific to red rot disease and 101 genomic SSR primers were designed and developed. Of these, 41.8% and 79.6% primers, respectively, were found polymorphic in cultivated sugarcane genotypes, different species and genera related to sugarcane, differing in response to red rot. A new class of functional markers, Conserved Intron Scanning Primer (CISP) from sugarcane were developed using ESTs of sugarcane and respective homologues in whole genome sequence of rice, sorghum and barley in order to find out the suitability of CISP markers in gene tagging in sugarcane. Ten CISP markers were found polymorphic with the number of alleles detected per locus ranging from 2 to 5.

White Grub Menace in western Uttar Pradesh

In recent time, white grub infestation has become a problem for cane growers and sugar mills of western U.P. A team of Scientists from IISR conducted a field survey to assess the white grub problem in the command area of Triveni Engineering & Industries Ltd., Sugar Unit: Deoband, Saharanpur and Titawi Sugar Complex, Titawi, Muzaffarnagar. The affected villages were Jakhwala, Mathura, Bhala, Niamu, Charthawal, Akabargarh, Sikanderpur, Badgaon, Khudda, Shimbhalki, Mogalapur, Mahabalipur, Kulheri, Pipalshah, Anaich, and Naglarai. The white grub infestation was recorded in about 200 ha sugarcane area, of which 17 ha was severely infested. In



general, 10- 30% damage due to white grub infestation in sugarcane crop was recorded, however, in the severely infested fields, complete crop failure was observed. The maximum damage was observed in the variety CoS 88230, while the variety CoS 767 was comparatively less damaged in the neighbouring fields, though the soil and other conditions were same. In the severely infested fields, the 4-7 grubs/clump were recorded at a soil depth of 10-25 cms. In general, infestation of white grubs was recorded in the sugarcane crop grown in sandy loam soil. To address the emerging white grub menace in western Uttar Pradesh, the IISR scientists formulated a project in collaboration with the mills, which may be launched soon.

Brainstorming on Post-Harvest Technology

A brainstorming meeting on post harvest technology of sugarcane including *Jaggery* and *Khandsari* was held under the Chairmanship of Dr. R. L. Yadav, Director, IISR, Lucknow on 24 October, 2009. The meeting was Co-chaired by Dr. S. K. Nanda, Project Coordinator, AICRP (PHT), CIPHET, Ludhiana and Professor B. P. N. Singh, Ex-Dean, College of Technology, GBPUA&T, Pantnagar was the Guest of Honour. About 50 participants from Maharashtra, Tamil Nadu, Uttaranchal, Punjab



and Uttar Pradesh states participated in the meeting. The group expressed confidence in sustenance and survival of *jaggery* and *khandsari* industry in the country, at the same time acknowledged the infrastructure and expertise developed by IISR in this area to disseminate the knowledge among end users. The emphasis was laid upon to improve productivity, quality and storability of *Jaggery* and *Khandsari*. However, it was opined that immediate attention be given on the *jaggery* with special reference to reduce losses during rainy season. The meeting ended with vote of thanks by Dr. Jaswant Singh, HoD, Agril. Engg., IISR, Lucknow.

IRC Meeting

The Institute Research Council (IRC) meeting was held under the Chairmanship of Director, IISR from 11-14 August, 2009. In the meeting, 97 on-going research projects were reviewed and suitable modifications/corrections were suggested by the house wherever such necessity arose. Chairman, IRC emphasized the need to fine-tune the research projects and convert raw research results into deliverables to maintain a steady flow of research outcome to the stakeholders and end users. He urged the scientists to formulate research projects on concurrent problem of climate change and its implications for sugarcane cultivation in India. In this meeting, 8 new project proposals were discussed and approved with the advice to incorporate suggested modifications.

FET of ARS Probationers Scientists

A multi-disciplinary team of six Agriculture Research Service (ARS) Probationer Scientists was deputed by the National Academy of Agricultural Research Management (NAARM), Hyderabad for Field Experience Training (FET) from 4-24 August, 2009 at the Institute. The Ismailnagar village in Gosaiganj block of Lucknow district was selected for FET. The Probationer Scientists analyzed the agro-ecological situations and constraints in farming through PRA techniques under the guidance of local FET Coordinator, Dr. D. V. Yadav and his team. Gradual decrease in soil productivity due to salinization as a result of water seepage from Indira Canal and low farm income due to lack of know-how about agricultural technology among the farmers in the village emerged as major constraints



in farming. They also undertook a 7 days industrial attachment training for orientation about functioning of the agro-industries and the line departments engaged in agricultural as well as rural development in the state.

Training for Development Personnel

Five days Training on *xluk mRiknu rduhd , oaxlusea, dhdr uk'ktho izllku* sponsored by State Agriculture Management Institute, Rehmankhera, Lucknow (U.P.) from 5-9 October, 2009 was organized. In this training, 29 officials of state line departments/agencies viz., Agriculture, Sugarcane Development, Plant Protection, ATMA, etc. from different parts of Uttar Pradesh and 3 farmers were trained. They were provided with latest knowledge in sugarcane production, protection and farm machineries for maximizing the sugarcane productivity.



Training for Foreign Nationals

An International training programme for the capacity building of Afro-Asian Rural Development Organization (AARDO) Member Countries on "Manufacturing and Storage of Jaggery" from 15th Nov. to 15th Dec., 2009 was organized by the Institute. The training programme was sponsored by the AARDO. Under this training, two persons viz., Mr. Raed Abd al Qader Mohamad Ali, Extension Officer, National Centre for Agricultural Research and Extension, Irbid, Jordan and Mr. Leonard Oloo Ofula, District Environmental & Land Development Officer, District Agriculture Office, Ministry of Agriculture, Maragoli, Western Province, Kenya were trained. They were provided with theoretical as well practical knowledge and skill on jaggery production, packaging and storage including latest information on sugarcane cultivation practices for optimization of profitability from sugarcane cultivation.

Krishi Vigyan Kendra

The KVK, IISR, Lucknow, organized as many as 31 On and Off campus vocational training for farmers, farm families, farm women and rural youth in diverse areas of agriculture, animal husbandry, human health and home management. A total of 696 participants were trained in diverse areas, such as soil sampling & testing, green manuring & balanced fertilizer application, INM, IPM, nursery management, kitchen gardening, intercropping in sugarcane, fodder production, rearing of dairy animals, poultry & pig farming, balanced diet for women and children, preparation of different milk products, drudgery reduction among the farm women etc. A total of 555 farmers in 20 groups from different states, sponsored by ATMA, Horticulture Mission, National Food Security Mission schemes visited IISR. During visit, farmers got "seeing is believing" experience of the various sugarcane production and protection technologies including different implements developed for sugarcane cultivation, the processing and storage of *jaggery* making and vermi-composting. A total of 157 FLDs on 32.5 ha areas were laid out on toria, mustard, pea, wheat, berseem, and sugarbeet (fodder). On-farm testing for evaluation of processing varieties of potato, effect of *paclobutrazol* to improve productivity of mango orchard, performance of balanced fertilization in mustard and assessment of newly released HYV of wheat was conducted.

Exhibition on Sugarcane Technology

An exhibition of sugarcane production technology was organized at NBFGR on the occasion of 27th Foundation Day Celebration of NBFGR, Lucknow on 12 December, 2009. The major objective of exhibition was to showcase the remunerative sugarcane production technologies through meaningful display of exhibits and sugarcane machines. About 500 farmers and development personnel visited the exhibition site and got benefited by interacting with the scientists.

Hindi Pakhwara Celebrated

To promote Hindi in daily office work "*Hindi Pakhwara*" was celebrated during 14-30 September, 2009. During the fortnight long celebration Various competitions viz., hindi translation, hindi typing, and maximum work done in Hindi were organized. A *Hasya Kavi Sammelan* was organized on 24 September, 2009. Renowned Hindi Kavi, Sri Wahid Ali Wahid, Sri Anil Baujharh and Sri Deval Ashish made the audience delighted and cheerful with their humorous recitation. The *Pakhwara* was concluded on 30 September, 2009 under the Chairmanship of the Director, IISR, Lucknow and he gave away the prizes to winners of different competitions.

Awards/Honour

Dr. S.N. Sushil, Senior Scientist (Entomology) received an award from World Intellectual Property Organization (WIPO), an agency of UN, for the best invention of the year-2008 for developing "Eco-friendly novel technologies for the management of white grubs in North-west Himalayas" during "Innovate India-2009" conference held on 19th November, 2009 at Indian Institute of Science, Bangalore.

Dr. A.K. Sah, Senior Scientist (Agril. Extension) has been elected Executive Councilor of Indian Society of Extension Education (ISEE), New Delhi for the period 2009-2012.

Human resource development

Dr. D. V. Yadav, Head, Crop Production Division attended special training programme for vigilance officers of ICAR Institutes from 29-31 October, 2009 at NAARM Hyderabad.

Dr. Om Prakash, (KVK) attended winter school on "Improving Sodic Soil Quality, Input Use Efficiency and Crop Productivity through Integrated Nutrient Management" from 21 November-11 December 2009 at CSSRI, Karnal.

Participation in Seminars/symposia/meetings

Dr. D. V. Yadav, Dr. R. K. Singh, Er. R. Gupta, Shri Mahendra Singh, Shri G. K. Singh and Dr. Om Prakash, attended Conference on "Food and Environmental Security through Resource Conservation in Central India: Challenges and Opportunities (FESCO-2009)" from 16-18 September, 2009 at CSWCRTI, Research Centre, Agra.

Dr. R.K. Singh, Programme Coordinator and Dr. V.K. Singh, SMS (Agronomy), KVK attended Annual Zonal Workshop of KVKs, from 22-24 October, 2009 at NDU&T, Faizabad.

Dr. R.K. Singh, Programme Coordinator (KVK), attended National Conference on KVKs, from 6 -8 November, 2009 at TNAU, Coimbatore.

Dr. D. V. Yadav presented a paper in International Symposium on "Potassium role and benefits in nutrient management for food production, quality and reduced environmental damages" from 5-7 November, 2009 at OUAT, Bhubaneswar.

Dr. Jaswant Singh attended and presented a paper in *Rastriya Hindi Sangoshthi* on "*Gramin Unnayan mein krishi prasansakaran udyog ki bhumika*" from 13-14 November, 2009 at CIPHET, Ludhiana.

Dr. D. V. Yadav attended and presented a paper in 5th Asian Regional Conference on "Improvement in efficiency of irrigation projects through technology up-gradation and better operation and maintenance" organized by Central Water Commission, Ministry of Water Resources, GoI and Indian National Committee on Irrigation and Drainage at New Delhi from 9-11 December, 2009.

Dr. S. I. Anwar and Dr. R. D. Singh attended and presented paper in International Conference on "Food security and environmental sustainability (FSSES- 2009)" from 17-19 December, 2009 at IIT, Kharagpur.

Dr. D. V. Yadav participated in Platinum Jubilee Symposium on "Soil science in meeting the challenges of food security and environmental quality" and also presented a paper in National Seminar on "Development in soil science-2009" organized by Indian Society of Soil Science, from 22-25 December, 2009 at New Delhi.

Dr. Jaswant Singh attended the 40th Institute Management Committee meeting of CIAE, Bhopal on 29 December, 2009.

Dr. A. K. Sah attended and presented a paper in National Seminar on "Enhancing efficiency of Extension for sustainable agriculture and livestock production" organized by ISEE, New Delhi from 29-30 December, 2009 at IVRI, Izatnagar, Bareilly.

Career advancement

In this period, following persons got promotion in their respective service career.

Dr. S.K. Duttamajumder, Principal Scientist joined as HoD, Crop Protection w.e.f. 10.08.2009.

Dr. R.K. Singh, Senior Scientist joined as Principal Scientist (Plant Biotechnology) w.e.f. 10.08.2009.

Promoted to AAO

Shri Sartaj Ali w.e.f. 01.09.2009.

Promoted to UDC

Shri Pankaj Kumar Arora w.e.f. 01.07.2009.

Shri Shyam Lal w.e.f. 08.09.2009.

Shri S.C. Jaiswal w.e.f. 08.09.2009.

Promoted to Assistant

Smt. Raj Shanker w.e.f. 01.09.2009.

Shri Nag Chand w.e.f. 01.09.2009.

Superannuation

Shri Maikoo Lal, S.S. Gd.II retired on 31.07.2009.

Shri Manna Lal, A.A.O. retired on 31.08.2009.

Er. M.P. Sharma, Principal Scientist retired on 30.09.2009.

Dr. A.P. Singh, Principal Scientist retired on 30.09.2009.

Shri Mathura Prasad, T-5 retired on 30.09.2009.

Transfer/Relieved

Dr. Deeksha Joshi, Scientist, SS (Pathology) joined IISR on 03.09.2009, on transfer from VPKAS, Almorha.

Dr Archna Suman, Principal Scientist was relieved on 31.07.2009 to join IARI, New Delhi.

Dr. V.K. Singh, SMS (Agronomy), KVK was relieved on 19.12.2009 to join KVK, Koderma, Jharkhand (under CRRI, Cuttack), as Programme Coordinator.

Necrology

Shri Ravi Kant Saxena, SSG.III expired on 13.09.2009.

Dr. R. K. Tewari, Principal Scientist expired on 12.11.2009.