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Rhizosphere and sugarcane productivity

Rhizosphere is the dynamic area surrounding root surface wherein the physical, chemical and biological activities in soil are greatly influenced by the root. In fact, this root-soil interface area acts as the conduit for the absorption of water and nutrients by the roots and also exercises great influence in the growth and productivity of crop plants. Increasing cropping intensities and extensive cultivation of high yielding varieties of wheat and rice, and imbalanced use of fertilizers have distressed the soil badly and thus, have imposed limitations in harnessing the productivity potential. Deterioration of soil health and fertility along with scarcity of irrigation water is largely responsible for the stagnation of crop productivity, especially in the Indo-Gangetic plains.

Sugarcane has an extensive root system and is known as a heavy feeder of soil nutrients and demands more of applied fertilizers for its optimum growth and yield. Interestingly, due to deeper and extensive root system and succession of root development, sugarcane is endowed with an inbuilt mechanism for soil amelioration like the legumes. It absorbs nutrients from the deeper soil layers, provides food base for a host of beneficial soil microorganisms that in turn help in fixing of atmospheric nitrogen, mineralization of soil nutrients, increasing soil organic carbon content, in residue recycling, etc. Contrary to the popular perception that sugarcane, due to its heavy nutrient demand exhausts the soil nutrient reserve badly, more and more evidences are forthcoming against this notion. Sugarcane is appearing to be a good soil fertility builder crop and it is more so in the irrigated ecosystem where pulses are losing their foothold.

In an analysis of district wise yield data of wheat and sugarcane, a gradual improvement in the yield of wheat has been observed in the districts of U. P., where sugarcane is occupying more than 20% of the cultivated area. It is apparent that sugarcane, in the prevailing cropping systems of Indo-Gangetic plain is helping in the maintenance of soil fertility.

In this regard, maintenance of soil health and fertility is crucial so that the rhizosphere remains in a position to provide the required nutrients to crop plants in adequate quantity. The soil-microorganisms, the nature's own nutrient miners have critical roles to play in arresting the decline in factor productivity in a sustainable manner. One has to tailor these microorganisms to suit the crop rhizosphere so that the bounty of soil nutrient reserve remains available. The associations of nitrogen fixing bacteria like *Gluconacetobacter* and organic matter decomposer like *Trichoderma* and free living *Azotobacter* with sugarcane agro-ecosystem have become far more important in the economy and use efficiency of applied fertilizers. Besides, residue recycling and extensive use of green manure crops, emphasis has to be given to the biological nitrogen fixation, phosphorus and sulphur solubilization, bioremediation and to improve the organic carbon content of the soil.

Similarly, increasing associations of mycorrhizal symbionts may improve the phosphorus availability to the sugarcane plant. Besides the improvement in fertility, these microbes produce various compounds and growth promoting substances that help in better crop growth, induce systemic acquired/induced resistance in plants and act as deterrents for many harmful microorganisms and thus, ensure better crop productivity.

The precious water may be conserved through mulches, deep tillage, and irrigation management and by applying water as per the crop requirement. Resource conservation should be the 'buzz' word in the sustenance of agriculture in future.

The planting and interculture operations in sugarcane provide enough opportunity to modify the root architecture and thereby the scope to change the water and nutrient uptake patterns. Similarly, the rhizosphere developed at the plant crop exercises great influence on the rhizosphere of the ratoon crop. In fact, shallow - microbial rich rhizosphere is the dominant factor in ratoon crop, which largely determines the crop productivity.



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New RAC Constituted

New Research Advisory Committee has been formed for IISR, Lucknow. The working duration of this high powered committee is of three years starting from 18.01.2008. Dr. H. K. Jain, ex Director, IARI, New Delhi is the Chairman of this new RAC of IISR. The other members are Dr. N. Balasundaram, ex Director SBI, Coimbatore, Tamil Nadu; Dr. B. L. Jalali, ex Director Research, HAU, Hisar, Haryana; Dr. D. N. Yadav ex Professor Entomology, AAU, Anand, Gujarat; Dr. D.G. Hapse, ex Director, VSI, Pune, Maharashtra; Dr. T. C. Thakur, National Professor, GBPUA&T, Pantnagar, Uttarakhand; Dr. K. C. Jain, ADG, (Commercial Crops), ICAR, New Delhi and Dr. R. L. Yadav, Director, IISR, Lucknow. Two farmer members are Mr. Krishnapal Singh Rathi, Muzaffarnagar, Uttar Pradesh and Mr. Anil Choudhury, Muradabad, Uttar Pradesh. Dr. D.V. Yadav, Principal Scientist and Head, Div. of Crop Production is the Member Secretary of this Committee.



AICRP Breeders' meet

A meeting of sugarcane breeders of North West, North Central and North Eastern Zones was held on 22 January, 2008 at the Sugarcane Research Institute, Pusa, Distt. Samastipur, Bihar for finalization of the Technical Programme of Breeding discipline for 2008-09. The meeting was chaired by Dr. N. Vijayan Nair, Director, SBI, Coimbatore and Principal Investigator (Crop Improvement, AICRP). The Chairman expressed satisfaction on the conduct of experiments and urged the centres to ensure timely despatch of seed materials with due receipt.

The meeting was attended by Dr. B.C. Choudhary, Director of Research, Dr. O. K. Sinha, Project Coordinator (Sugarcane), Dr. V. P. Singh, Director, Sugarcane Research Station, Pusa and breeders of the respective zones. Dr. B.C. Choudhary welcomed the participants and gave an account of constraints in sugarcane cultivation in Bihar. Dr. N. Vijayan Nair highlighted the problems and potential of sugarcane cultivation in Bihar. Finally the Breeders' Group discussed the performance of entries during 2007-08 crop season and short-listed the entries for further evaluation in 2008-09. Dr. V. P. Singh proposed the vote of thanks.

Trainings

During this period, 13 students from different Institutes and Universities like Beehive College, Garhwal, Uttarakhand; Jaipur National University, Rajasthan; VIT University, Vellore, Tamil Nadu; Allahabad Agricultural Institute Deemed University, Allahabad; Chaudhary Charan Singh University, Meerut; AMITY University, Lucknow and IILM, Greater Noida were trained in Biotechnology and Microbiology.

Training of Sugarcane Development Personnel

IISR is regularly organising one-month (July 1-31) training for sugarcane development personnel to abreast them of the latest knowledge of sugarcane farming. This training is becoming popular and gradually drawing attention of the sugar industries. This year, 17 trainees from different parts of India, representing different sugar mills attended this training. In this training programme, 76 lectures along with practicals were conducted.



CoLk 94184: a high sugar early variety

CoLk 94184 (Birendra), a high sugar early maturing sugarcane variety developed by IISR was identified for cultivation in North Central Zone comprising eastern Uttar Pradesh, Bihar, Jharkhand and West Bengal.



It is an excellent ratooner and tolerant to both drought and waterlogging stresses. The variety has recorded an average cane yield of 75.97 t/ha, CCS 9.28 t/ha and sucrose 17.97%.

Meeting of RAC

The 14th Research Advisory Committee (RAC) meeting under the Chairmanship of Dr. H. K. Jain, Ex. Director, IARI, New Delhi was held on 8-9 July, 2008. Members of the RAC, Dr. B. L. Jalali, Dr. D. N. Yadav; Dr. D.G. Hapse, Dr. T.C.Thakur, Mr. K. S. Rathi, Mr. A. Choudhury, Dr. R. L. Yadav, Director, IISR, Dr. D.V. Yadav (Member Secretary) and all the Head of Divisions and scientists took part in the meeting. The RAC appreciated the progress made by the Institute in the past, and gave their nod of satisfaction to the current work.



Krishi Vigyan Kendra & Kisan Call Centre

The KVK, housed at IISR, regularly imparts both on-campus and off-campus trainings to farmers, farm families and rural youth in diverse areas of agriculture, animal husbandry and home science. During this period, 12 trainings were organized on various aspects like sugarcane ratoon management, improved methods of cultivation on mentha, okra and cucurbits, organic cultivation of vegetables, post harvest management of potato tubers, management of dairy animals, preparation of *aonla murabba*, etc. During this period, a total of 244 participants got enrolled in various training programmes.

In this period, 634 farmers (22 groups) from different states under ATMA scheme visited IISR. These farmers got a first hand feel of the various sugarcane production and protection technologies including different implements developed for sugarcane cultivation and the process of jaggery making. KVK has also organised Front Line Demonstrations on different crops.

A Kisan Mela was organised at Beniganj village, Mohanlalganj on March 26, 2008 wherein about 1000 farmers visited the Mela. Besides sugarcane production technology, IISR also exhibited RBS cutter planter and cube-shaped jaggery in this Mela.

Similarly, an animal fertility camp was also organised wherein 215 animals were checked-up.

During this period, the KVK started publication of a magazine entitled "*Kisan Jyoti*" in Hindi for the benefit of the farmers.

Kisan Call Centre, a part of the KVK, is very active in responding to various farmers' queries relating to sugarcane cultivation.

Documentary film

IISR has set foot in digitising sugarcane cultivation practices. Three documentary films, starting with "*Bhartiya Ganna Anusandhan Sansthan: Ek Jhalak*", a 30 min film in digital format, highlighting the contribution of IISR in the sugarcane production scenario in India have been developed. Planting remained a major activity in sugarcane cultivation. In the film "*Ganna Buawi Vidhiyan*" - various sugarcane planting methods commonly adopted in India have been shown. Ratoon management remained the main focus of the 30 min film entitled "*Pedi Prabandhan*". This film depicted the procedures to raise and maintain a good ratoon crop of sugarcane.

TV talk

During this period, several TV talks were delivered on different aspects by Dr. R. L. Yadav, Dr. Menhi Lal, Dr. A. K. Sah and Dr. R. K. Singh.

Exhibition

IISR was the venue for the National Level Agri-Expo 2008, organised jointly by the Centre for Agriculture and Rural Development (CARD), New Delhi and ASSOCHAM, New Delhi from 16-19 February, 2008. Hon'ble Minister for Food Processing, Govt. of India, Shri Subodh Kant Sahay visited each and every stall and lauded the efforts. During this exhibition, IISR showcased sugarcane production and protection technologies, various implements including cutter planters, ratoon management device (RMD), etc. to the visitors. About 5000 farmers from all over the country visited the IISR stall during Agri-Expo 2008 and got abreast of new and emerging technologies in sugarcane farming. Besides six institutes of ICAR, several other reputed institutions of both public and private domains participated in this Agri-Expo. Every aspect of agriculture from seed, fertilizers, implements, irrigation management, pesticides, harvesting and post harvest processing and management, management of animals, etc. including crop insurance and crop loans were well represented in this Expo. This Expo provided a window to the farmers for looking beyond the traditional farming, ways of storing the produce in a better way and value addition to the farm produce to generate more income in a sustainable manner.



Awards/Honour

Dr. Jaswant Singh, Head, Agril. Engineering has been elected as Vice-President (Technical Council) of the Indian Society of Agricultural Engineers, New Delhi for 2008-10.

Externally funded project

During this period, IISR received a Farmers' Participatory Action Research Project from the Ministry of Water Resources, Govt. of India. This project is of three years duration and has a budget of Rs. 50 lakh.

Career advancement

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

Promoted to Personal Assistant

Smt. Veena Sharma w.e.f. 16.02.2008

Promoted to Personal Secretary

Shri Rajiv Kumar Arora w.e.f. 16.02.2008

Promoted to T-4

Shri Anil Kumar Singh w.e.f. 03.07.2006

Shri C. P. Prajapati w.e.f. 05.09.2006

Promoted to T-5

Shri Fauzdar Singh w.e.f. 01.01.2006

Smt. Neelam Singh w.e.f. 15.10.2006

Smt. Meena Nigam w.e.f. 01.01.2007

Shri R. K. Singh w.e.f. 13.03.2007

Shri Umesh Kumar w.e.f. 18.08.2007

Shri Chaman Singh w.e.f. 29.09.2007

Shri Surya Deo Singh w.e.f. 01.01.2008

Promoted to T-6

Shri M. H. Ansari w.e.f. 24.11.2006

Smt. Anita Sawanani w.e.f. 27.09.2006

Shri Ram Darash w.e.f. 01.01.2007

Dr. Om Prakash w.e.f. 16.12.2007

Shri Vijay Bahadur Singh w.e.f. 01.01.2008

Shri Surendra Singh w.e.f. 02.01.2008

Shri L. K. Lama 3 advance increments w.e.f. 14.06.2006

Promoted to T-(7-8)

Shri R. K. Shukla w.e.f. 01.01.2005

Smt. Hem Lata Madhok w.e.f. 03.02.2005

Dr. S. K. Awasthi w.e.f. 03.02.2005

Dr. H. P. Pande w.e.f. 03.02.2005

Shri Sanjay Bhatnagar w.e.f. 27.09.2005

Dr. Mani Ram Verma w.e.f. 01.01.2006

Shri V. K. Singh w.e.f. 16.03.2007

Promoted to Principal Scientist

Dr. Om Prakash w.e.f. 01.07.2004

Dr. S. K. Duttamajumder w.e.f. 27.07.2006

Dr. Rajesh Kumar w.e.f. 27.07.2006

Superannuation

Dr. Menhi Lal, Principal Scientist (Agronomy) and Head, Div of Crop Production retired on 31.01.2008.

Dr. S. Pandey, Principal Scientist (Plant Pathology), retired on 29.02.2008.

Shri Bikram Singh, UDC retired on 30.04.2008.

Dr. B.L. Singh, Principal Scientist (Agronomy) retired on 31.05.2008.

Dr. S. N. Srivastava, Principal Scientist (Plant Pathology) retired on 30.06.2008.

Shri Ramayan Singh, T-5 retired on 30.06.2008.

Shri J. Ganguly, T-5 retired on 30.06.2008.

Transfer/relieving/joining

Shri Aparesh Mukherjee, Assistant joined on 05.05.2008 after completion of deputation period as AAO at NRCWS, Jabalpur, M.P.

Dr. Pranay Kumar, Principal Scientist (Plant Breeding) joined IISR on 24.03.2008 on transfer from NRC Pomegranate, Sholapur, Maharashtra.

Dr. Ishwar Singh, Senior Scientist (Plant Physiology) was relieved from IISR, Lucknow on 29.02.2008 on transfer to join Directorate of Maize Research, IARI, New Delhi.

Human resource development

Dr. Rakesh Kr. Singh has received the Ph. D. degree from Dr. B. R. Ambedkar University, Agra on 26.06.2008. He worked on the topic "A study on production and marketing of milk in Mohanlalganj and Sarojinagar blocks of Lucknow district of Uttar Pradesh".

Shri Prem Chandra, Personal Assistant attended 46th Refresher Training Course for Personal Assistant from 24 March to 04 April, 2008 at ISTM, New Delhi.

Participation in seminars/symposia/meetings

Dr. Jaswant Singh attended the seminar on "Instruments for Food and Agriculture Research" organized by the Scientific and Digital Systems, New Delhi from 26-27 February, 2008.

Dr. Jaswant Singh attended the AICRP (PHT) meeting at OUA&T, Bhubaneswar from 02-03 May, 2008.

Necrology

Captain R.A.S. Yadav, Security Officer, IISR, Lucknow left for his heavenly abode on 04.05.2008.

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