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भाकृअनुप
ICAR

ICAR-IIWM News

भाकृअनुप - भा.ज.प्र.सं. समाचार

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In this issue

DIRECTOR'S COLUMN

Groundwater Management in India: PARADOXICAL APPROACHES versus PRAGMATIC SOLUTIONS

Groundwater, the largest source of unfrozen fresh water, serves the humankind worldwide in multiple ways including agricultural activities. India has become the world's largest groundwater user and also witnessing its fastest depletion as is evidenced from scientific research, the proliferation of deep tube-wells and implementation of subsidized farm power policies in different states. In this context, estimation of resources and documentation of the changing landscape of groundwater irrigation is very crucial to ensure sustainable water management. The latest 2013 estimation of groundwater resources by the Central Ground Water Board (CGWB) points to the withdrawal of about 253 BCM of water, which amounts to about 62% of the net available annual groundwater development.

The 5th minor irrigation census report as recently published, has clearly highlighted the spectacular rise of deep tube-well frequency, from 0.5 million during 2001-02 to 2.6 million during 2013-14. At the same time, the surface water schemes have decreased marginally. Most of these deep tube-wells have spread across the southern peninsular India, which is the predominated hard rock aquifer and a zone of scarce rainfall with low infiltration rate. The northwest India comprising the states of Punjab, Haryana and Rajasthan, is well-known for its pronounced groundwater depletion, and the estimated groundwater development is more than 130%. Less understood, however, for the states like Andhra Pradesh, Karnataka and Tamil Nadu, where there is low groundwater development, but withdrawals through tube-wells are rampant, so also the depletions. Thus, there is a need to improve the monitoring and assessment procedures in the semi-arid to arid regions of India, where water stress critically impedes agricultural growth due to climate change.

Different technological options have been evolved, evaluated and adopted for both over- and under exploited areas in the country. Rain water, being the prime source of water, should be conserved and managed for efficient utilization of groundwater in the long-term. Identification and delineation of groundwater potential and recharge zones has been widely used for planning and developing regional decision support system through remote sensing and GIS for sustainable use of groundwater resources. A handful of technologies have been developed by ICAR-IIWM and AICRP-IWM centres for improving groundwater status in over-exploited areas. Proper design of water harvesting structures, use of abandoned dug-

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wells, roof top water harvesting structures, low cost rainwater harvesting structures, percolation tank and haveli systems are a few of the options. Few groundwater recharge techniques like recharge well, recharge shaft, bore-well have been tested and evaluated, and the design parameters have been standardized. In case of under developed and poor quality groundwater region, conjunctive use of surface and groundwater, groundwater pumping options have been developed through mathematical simulation modeling. Still there is a lot of scope to improve the groundwater quantity and quality through proper management strategies. Basin wise or the aquifer-based groundwater management planning should consider productivity of aquifers, delineation of vulnerable areas, conservation of surface runoff, control of salt water intrusion, storage of water by reducing pumping, regulation of groundwater abstraction etc. Renovation of traditional or indigenous water conservation structures, creation of subsurface dykes and fractures sealing cementation techniques can be adopted to arrest sub-surface flows to conserve rainwater and increase groundwater recharge. Basin-wise balancing of aquifer recharge and discharge, abstraction regulations and integrated conjunctive use of surface and groundwater is highly recommended for sustainability of the water resources.

RESEARCH ACHIEVEMENTS

DUG WELL BASED DRIP FERTIGATION SYSTEM FOR HARD ROCK AREAS - A SUCCESS STORY

The productivity of hard rock and rainfed areas in eastern India is very low (<2.0 tha^{-1}) and unstable because of erratic monsoon, moisture deficit during dry spells, light textured soils with less fertility. To improve water and nutrient use efficiency of hard rock areas, suitable open dug-well was constructed (depth: 8m, inner dimeter:3 m, recharge rate: 1.5-1.9 m^{3}hr^{-1}) and on-farm experiments on dug-well based drip-fertigation were conducted in representative farmer's field of Parbatiya, Dhenkanal and Gudpara, Cuttack, Odisha during 2015-16 to 2018-19. Based on the estimated command area under each open-dug well, diversified vegetable crops (cucumber, potato, bitter gourd, ridge gourd, chilli, okra, and cowpea) were grown.

The fertigation treatment in each crop included T_1: Surface irrigation + 100% recommended dose of fertilizer (soil application), T_2: drip + 100% RDF (soil application); T_3:drip + 100% RDF (fertigation); T_4: drip + 80% RDF (fertigation); T_5: drip + 60% RDF (fertigation) and results have been presented in Table1. The design was RBD with 3 replications. The irrigation was applied through drip under 80% ETc alongwith soluble fertilizer (19-19-19 of N-P_2O_5-K_2O) at different doses. The irrigation was applied through drip under 80% ETc alongwith 100% soluble fertilizer (19-19-19 of N-P_2O_5-K_2O). The results of fertigation on different crops during 2018-19 are given in Table-1. Study revealed that drip + 100% RFD through fertigation (T_3) was the best to improve yield but statistically at par with the drip + 80% RFD fertigation (T_4).

Table 1. Comparison of crop productivity of vegetable crops under drip-fertigation and soil application of fertilizers

Treatments	Bitter gourd		Ladies finger		Cowpea	
	Fruit yield (t ha^{-1})	Yield (t ha^{-1}) increase over T_1	Fruit yield (t ha^{-1})	Yield (t ha^{-1}) increase over T_1	Pod yield yield (t ha^{-1})	Yield (t ha^{-1}) increase over T_1
T_1: Surface irrigation + 100% RDF (soil application	6.8	…	9.3	…	5.1	..
T_2: Drip + 100% RDF (soil application) ;	8.5	1.7	12	2.7	8.8	3.7
T_3: Drip + 100% RDF (fertigation)	11.1	4.3	14.8	5.5	11.2	6.1
T_4: Drip + 80% RDF (fertigation)	10.3	3.5	14.1	4.8	11	5.9
T_5: Drip + 60% RDF (fertigation)	8.7	1.9	12.1	2.8	9.2	4.1
$LSD_{0.05}$	1.95	-	1.45	-	1.4	-

G. Kar, P.S.B. Anand, M. Raychaudhuri, D.K. Panda, S.K. Ambast and A. Kumar

MOBILE APP ON AGRI-WATER EXPERT - A NEW INITIATIVE

In Indian and also in abroad a lot of information have been generated for efficient utilization of water resources for agriculture and allied sectors. However, very little efforts have been made in developingan expert system on various water management aspects. So there is a need to develop a comprehensive water management expert system alongwith android-based mobile application for use bydifferent end users.

An android-based mobile app on expert system on agricultural water management was developed by the scientists of ICAR-IIWM, Bhubaneswar to catalogue water management practices in agriculture, horticulture, high value aquaculture and animal husbandry activities (Fig. 1a). The mobile app has mainly four modules: i) Agriculture, ii) Horticulture, iii) Aquaculture, and iv) Animal husbandry (Fig. 1b). The data on water management aspects in various crops were compiled. The user can search the water management practices on crop basis. The agriculture module contains four sub-menus like cereals, pulses, oilseeds and commercial crops (Fig. 1c), whereas the horticulture module contains sub-menu like vegetables, fruits and flowers (Fig. 2a). In the cereal module, the water management practices of various major crops like rice, wheat, maize, sorghum and pearl millets etc. are available for different seasons with different water availability situations.

In aquaculture module, the program has been created for displaying suitable water management interventions in different aquaculture systems under upland, medium land, low land and coastal areas. Based on the user and land type, the aquaculture interventions are further classified as coldwater aquaculture, production of carp fry, fingerlings, grow-out technology, catfish culture, freshwater prawn culture, ornamental fish culture, freshwater pearl culture, integrated rice-fish system and shrimp culture (Fig. 2b). The system will display the general information, culture techniques, water quality indicators and other options as per the users' requirements. In animal husbandry module, options have been created to select drinking water requirements or services for various animals like cattle, goat, pig, horse etc. The system will display general information, animal type, range of water requirement and average water use per day for that animal (Fig. 2c). The benefit of an expert system is that it can offer better solution than a traditional method by using the various knowledge stored in the database. It is proven that expert systems help a lot to the end-users in increasing crop production in the region through providing information about appropriate water management techniques. Thus the expert system on agricultural water management is expected to be useful for different stakeholders like farmers, extension personnel, NGO and other officials.

Fig. 1a.
Main menu of the app

Fig. 1b.
Search by commodity menu

Fig. 1c.
Agriculture sub-menu

Fig. 2a.
Information about horticultural crops

Fig. 2b.
Aquaculture module of the mobile app

Fig. 2c.
Animal husbandry module of the mobile app

A.K. Nayak, P.K. Panda and R.K. Mohanty

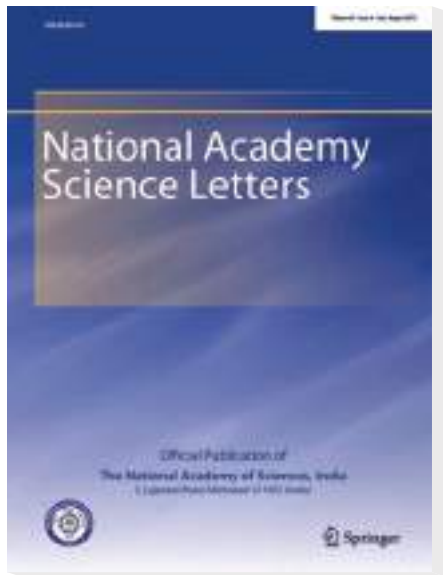
PAIRED-ROW PLANTING AND FURROW IRRIGATION INCREASED POD YIELD AND WATER USE EFFICIENCY OF GROUNDNUT

Groundnut (*Arachis hypogaea* L.), also known as 'peanut', is one of the dominant oilseed crops in India. It is cultivated in an area of about 4.77 million ha with 7.40 million tonnes of production in the country. The average groundnut yield is 1268 kg ha^{-1} in Odisha state, which is lower than the national average yield (1552 kg ha^{-1}). As the fresh water for irrigation is scarce, it is imperative to save irrigation water, increase water use efficiency (WUE) and yield of this crop. With this background, a multidisciplinary team of scientists at ICAR-IIWM, Bhubaneswar conducted field trials and evaluated groundnut responses to irrigation regimes and planting techniques for groundnut under Deras minor irrigation command in Odisha.

It has been revealed that paired-row planting at 45 x 15 cm spacing increased pod yield by 17% with water saving of about 42%, and consequent increase in crop WUE by 48% over flat-bed method. Better root dry weight, greater intercepted photosynthetically active radiation, chlorophyll fluorescence (Fv/Fm and ΦPS II) and rate of leaf photosynthesis contributed to higher yield and nutrient uptake under paired-row at higher irrigation regime than traditional flat-bed method. With adequate moisture in higher irrigation regimes, soil temperature remained favorably under hot sub-humid conditions. The pod yield (*y*)-*ET* functions were found linear, and it has been estimated that the crop will achieve maximum pod yield (2109 kg ha^{-1}) with 359 mm ET under paired-row planting. Computed elasticity of water production and crop yield response factor could well be used for making irrigation decisions. This field study confirmed that paired-row planting and furrow irrigation increase pod yield, save irrigation water and increase WUE of groundnut under hot sub-humid conditions.

Adapted from K.G. Mandal, A.K. Thakur and S. Mohanty, 2019. Paired-row planting and furrow irrigation increased light interception, pod yield and water use efficiency of groundnut in a hot sub-humid climate. Agricultural Water Management (Elsevier), 213: 968-977. View the full article online at https://doi.org/10.1016/j.agwat.2018.12.018.

FITTING PINEAPPLE (*ANANAS COMOSUS L.*) IN RAINFED RICE CROPPING SEQUENCE IN EASTERN INDIA



In eastern India, majority of areas under rainfed ecosystem are left fallow after *kharif* rice mainly due to lack of availability of irrigation water. Under this situation, pineapple is a suitable crop due to its adaptation system of crassulacean acid metabolism for photosynthetic carbon fixation. Pineapple is a long-duration crop (16-18 months) with irregular flowering behavior. Scientists from ICAR-IIWM studied the feasibility of growing pineapple crop after harvest of *kharif* rice in the yearly sequence for two consecutive years (2009-2011). Ethephon hormone was applied at 10-month stage of crop to induce uniform and early flowering. In addition to this general treatment, spray of planofix at 50 mg l^{-1} (after 15 days of ethephon application at 20 mg l^{-1}) resulted in the maximum flowering (81.2%). Similarly, 79.9% flowering was recorded when the plants were grown under shade. Also, spray of planofix resulted in the highest fruit yield (16.9 t ha^{-1}) of pineapple due to increased fruit size. Fruit quality in terms of total soluble solids (14.85%) and vitamin C (150.18 mg kg^{-1}) content improved, and fruit acidity (0.58%) decreased with spray of planofix. Therefore, pineapple can be grown in rice-based cropping system after harvest of *kharif* rice with suitable hormonal treatment, which will bring down the duration of pineapple crop to about 14 months (8 months in nursery and 6 months in main field).

Adapted from O.P. Verma, S. Roychowdhury, S.K. Rautaray, M. Raychaudhuri, E. Antony, S.K. Ambast and P.S. Brahmanand, 2019. Fitting pineapple (Ananas comosus L.) with rainfed rice in the cropping sequence in eastern India. Natl. Acad. Sci. Lett. (Springer). View the full article online at https://doi.org/10.1007/s40009-019-00820-2

RESEARCH MEETINGS

INSTITUTE RESEARCH COUNCIL (IRC) MEETING

Institute's Research Council (IRC) meeting was organized during June 3-6, 2019 at ICAR-IIWM under the Chairmanship of Dr. S.K. Ambast, Director of the institute. At beginning, Chairman highlighted the immediate and long-term challenges in the field of agricultural water management. He emphasized upon taking up of research projects that should provide solutions tothe farmers in the field of irrigation water management. Developed technologies of the institute should be transferrable to the end-users for greater visibility of the institute at national and international levels, and our efforts will lead to doubling the farm income. Results of the twenty four on-going in-house research projects were presented and deliberated in the meeting under different programs. Also, four new research project proposals were presented and discussed. The Chairman, IRC concluded with remarks and encouraged scientists to continue good work, timely reporting and systematic record keeping. He also emphasized to find out parameters like water use efficiency, water productivity, agricultural productivity, net return and water saving from most of the projects, and publication after completion of each project. Dr. S.K. Jena, Principal Scientist and Member Secretary of the IRC, acted as the organizing secretary of the meeting.

EVENTS, NEWS & CELEBRATIONS

TRAINING HOSTEL ANNEX INAUGURATED AT ICAR-IIWM

Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR), New Delhi inaugurated the Training Hostel Annex of ICAR-Indian Institute of Water Management (IIWM), Bhubaneswar on February 9, 2019.

REPUBLIC DAY CELEBRATION

The 70th Republic Day of the country was celebrated on January 26, 2019 by the Institute. On this occasion, national flag was hoisted by the Chief Guest & Director of the institute. He addressed the staffs and family members of the Institute with encouraging words and urged upon the need for hard work and dedication by the staffs for the welfare of farming community, and to make the institute as well as the country proud.

ICAR-IIWM OBSERVED NATIONAL PRODUCTIVITY WEEK

The 'National Productivity Week' was observed during February 12-18, 2019 at the Institute with the theme, 'Circular Economy for Productivity and Sustainability'. Four separate events were organized on different dates to mark thisoccasion, viz. observation of National Productivity Day at ICAR-IIWM on February 12, 2019, demonstration-cum-training program on vermicomposting at Bhakar Sahi village of Balipatana block on February 15, 2019, farmer-scientist interface meeting on 'Improving agricultural productivity and sustainability through efficient resource management' at Hansapada village of Nimapara block, Puri district on February 16, 2019, and an awareness program on National Productivity Week at the Saraswati Sishu Vidya Mandir, Niladri Vihar, Bhubaneswar on February 18, 2019. Dr. H.K. Dash, Principal Scientist, Dr. D. Sethi and Mr. P. Deb Roy, Scientists coordinated these events.

ICAR-IIWM CELEBRATED INTERNATIONAL WOMEN'S DAY

The International Women's Day was celebrated on March 8, 2019 at the Institute. The focal theme was 'Think equal, build smart, innovate for change'. On this occasion, all staff of the Institute assembled in the committee room and witnessed the address and watched the interaction of Hon'ble Prime Minister with the SHGs through web-cast in which the Prime Minister honoured some of the women beneficiaries of different welfare schemes at Pandit Deen Dayal Upadhyay Hastkala Kankul at Varanasi. Apart from this, the Scientists and research scholars shared their views on the role of women in today's society and gender equality.

An interaction meeting was organized to celebrate International Women's Day on March 8, 2019 at ICAR-IIWM Research Farm, Deras, Mendhasal. Forty three women farmers from five MGMG selected villages viz., Giringaput, Durgapur, Chhatabar, Haridamada and Jamujhari participated in the meeting. Scientists from ICAR-IIWM discussed on issues like importance of women in agriculture especially in agricultural water management, various water management technologies, promoting entrepreneurship ability of women's and rearing of farm animals with proper mediation and supplements etc. Dr. P.K. Panda, Dr. R. Dubey and Dr. D. Sethi organized this meeting.

Dr. M. Das and Dr. R.R. Sethi, Principal Scientists of this Institute participated and expressed their views in a State-level Convention of Women Scientists and Technologists organized by the Institute of Life Sciences, Bhubaneswar. The purpose of the first ever convention of women scientists in Odisha was to provide a platform to raise, discuss and provide constructive and implementable solutions to several practical problems being faced for large number of women scientists, scientific education, research and social commitments.

CELEBRATION OF INTERNATIONAL DAY OF YOGA

The 'Festival of Yoga and Wellbeing' was celebrated at the Institute on the occasion of International Day of Yoga on June 21, 2019. Two days yoga practice was held on June 19-20, 2019. A mass yoga was performed in the morning on June 21, 2019 as per the Common Yoga Protocol (CYP), which was issued by the Ministry of Ayush, Government of India. In the forenoon hours, competitions were heldon slogans and article writing on yoga. Dr. S.K. Ambast, Director, elaborated the importance of the International Yoga Day and urged everybody to practice yoga every day for maintaining good health. The program was coordinated by Dr. S. Mohanty, Principal Scientist and Nodal Officer of the International Day of Yoga.

HRD, TRAININGS, CAPACITY BUILDING & TECHNOLOGY DISSEMINATION

ICAR-IIWM ORGANIZED SAARC TRAINING

An international programme was organized on 'Regional Training on Smart Agricultural Water Management Interventions for Enhancing Water Productivity and Resilience in South Asia' during June18-22, 2019 at the Institute in collaboration with SAARC Agriculture Centre (SAC), Dhaka and International Water Management Institute – India (IWMI-India). Twelve trainees from National Agricultural Research and Extension Systems (NARES) of seven SAARC member countries, viz. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka participated in this training program.

The main aim of this training program was to develop a team of master trainers and to establish a network of practitioners of smart agricultural water management to continue exchange of knowledge and technology in the region. It is imperative that SAARC member countries implement best practices of water resource management and gear towards increasing water-use efficiency for sustainable agriculture in the region under climate change scenario.

This training was inaugurated by Dr. P.K. Agrawal, Hon'ble Vice-Chancellor, Orissa University of Agriculture and Technology, Bhubaneswar and Dr. A.K. Sikka, IWMI, India. Dr. S.K. Ambast, Director, ICAR-IIWM welcomed guests and participants. Valedictory function was graced by the Chief-Guest, Dr. Himanshu Pathak, Director, ICAR-NRRI, Cuttack on June 22, 2019. Dr. Pathak distributed certificates to the trainees. Dr. S.K. Ambast, Director, ICAR-IIWM was the Course Director & Dr. A.K. Thakur, Principal Scientist and Dr. P. Panigrahi, Senior Scientist of the institute coordinated this training program.

CAPACITY BUILDING OF KVK PERSONNEL ON WATER MANAGEMENT TECHNOLOGIES

ICAR-IIWM organized a four-days training on 'On farm water management technologies for improving water productivity' at the Institute during January 21-24, 2019. The objective of this training program was to strengthen the capacity of KVK personnel on different aspects of water management for better dissemination of technologies to the farmers in diverse agro-climatic situations and for achieving the goal of doubling farmers' income by the year 2022. Forty-one trainees covering 16 and 20 districts of West Bengal and Odisha, respectively participated in this training programme. Dr. M. Das, Principal Scientist and Dr. O.P. Verma, Scientist of the Institute coordinated the capacity building program.

WORKSHOP ON 'ROADMAP TO SUSTAINABLE WATER MANAGEMENT IN AGRICULTURE'

An interactive workshop was organized at the Institute on 'Roadmap to Sustainable Water Management in Agriculture: Future Pathways' on February 9, 2019 under the Chairmanship of Dr. T. Mohapatra, Hon'ble DG, ICAR and Secretary, DARE, New Delhi. Presentations were made by the Scientists of the ICAR-IIWM to prepare the roadmap for sustainable water management in agriculture. Dr. Mohapatra emphasized the importance of sustainable and precise use of water in agriculture in the era of climate change. He also exhorted that ICAR-IIWM would play a prominent role in agricultural water management not only at national but also at the global level in imparting technical know-hows of modern methodologies of water management and strengthening the competency skills through capacity building programs. He emphasized to chalk out an immediate medium- and long-term action plan to develop a sustainable agricultural water management strategy at the national level. He observed that climate change impacts have demanded greater efforts than before for conserving precious water resources and there is a need of inter-institutional collaboration on water management research so that it will cater to the needs of other sectors like animal husbandry and fisheries. Dr. Mohapatra also released a Hindi *Patrika* '*Krishi Jal*' on the occasion. Earlier, Dr. S.K.Ambast, Director, ICAR-IIWM, Bhubaneswar welcomed guests and dignitaries, and outlined the sub-themes of the program.

Directors, Regional Heads and Scientists of Bhubaneswar-Cuttack based ICAR institutes attended the inaugural ceremony as well as the interactive workshop, and deliberated on issues of sustainable water management in agriculture at the national level for doubling of farmers' income. Dr. G. Kar and Dr. S.K. Jena, Principal Scientists organized this workshop.

PARTICIPATION IN CAPACITY BUILDING TRAININGS BY ICAR-IIWM STAFF

Official & Designation	Subject	Organization	Period
Mr. L. Singh Tiyu, STA	Automobile Maintenance; Road Safety & Behavioral Skill	ICAR-CIAE, Bhopal	January 16-22, 2019
Mr. S.K. Singh, AO Mr. V.K. Sahoo, FAO	Sensitization Workshop of E-Office	ICAR-IASRI New Delhi	January 23-24, 2019
Dr. M. Das, Principal Scientist	Geospatial Analysis using QGIS and R	ICAR-NAARM, Hyderabad	February 1-6, 2019
Dr. K.G. Mandal, Principal Scientist	MDP on Leadership Development (a pre-RMP programme)	ICAR-NAARM, Hyderabad	June 11-22, 2019

TRAINING ORGANIZED BY ICAR-IIWM

Subject	Place	Period	Participants
On-farm Water Management Technologies for Improving Water Productivity	ICAR-IIWM, Bhubaneswar	January 21-24, 2019	41
Stakeholders' Workshop on State Irrigation Plan of Odisha under PMKSY	ICAR-IIWM, Bhubaneswar	February 4, 2018	15

FARMERS' TRAINING PROGRAMS ORGANIZED BY ICAR-IIWM

Subject	Place	Period	Participants
Farmer's training program-*cum*-demonstration on 'System of Rice Intensification (SRI) method of rice cultivation' under Farmer's FIRST project	Malarpada village, Keonjhar	January 11, 2019	30
Kisan Mela for 'Enhancing economic water productivity in irrigation command'	Sina Medium Irrigation Project Site, Maharashtra	February 14, 2019	100

FARMERS/STUDENTS-EXPERTS INTERACTION-CUM-EXPOSURE VISIT PROGRAMS

Farmers/ Students from	Date	Participants
Srikakulam District, AP	January 28, 2019	25
Jharkhand Agriculture and Management Institute, Ranchi	February 2, 2019	51
Agro-Polytechnic Centre (OUAT), Bhadrak	February 19, 2019	19

EXHIBITIONS

Institute's technologies were displayed/ showcased in the following exhibitions held in different locations:

Prof. Ganeshi Lal, Hon'ble Governor, Odisha visited the exhibition stall of ICAR-IIWM

Events	Place	Date / Period
State-level Exhibition (*Krushi* Odisha 2019)	Baramunda, Bhubaneswar	January 15-19, 2019
Exhibition organized by ICAR-IISWC, Dehradun and IASWC, Dehradun	ICAR-IISWC Regional Centre, Sunabeda, Koraput	February 6-8, 2019
Exhibition	ICAR-CIFA, Bhubaneswar	February 18-19, 2019
State-level *Kisan Mela*	ICAR-NRRI, Cuttack	February 26, 2019

PARTICIPATION IN *SWACHH BHARAT ABHIYAN*

The Director and staff of ICAR-IIWM, Bhubaneswar participated actively in *Swachh Bharat Abhiyan* and seven number of cleanliness campaigns and eight number of *Swachhta* awareness campaigns were conducted during January to June 2019 in the Institute main campus, public places and MGMG villages. Backside area of ICAR-IIWM Guest House was cleaned; weeds and drains were also cleaned for better sanitation. Government e-Market (GeM) and ICAR-ERP has been fully implemented with updated versions at the institute during this period. The old files of bill and establishment section have been sorted out and some files have been removed. Landscaping, pruning of old trees and beautification inside the main campus of the Institute was done. Planting of custard apple saplings was done inside the main campus of the Institute. Awareness was created among school children of Vivekananda Siksha Kendra, Bhubaneswar on vermi-composting. Awareness was also created among residents of Nalco Nagar Santal Basti, Chandrasekharpur, Bhubaneswar on conversion of waste to wealth and importance of cleanliness for a healthy society. Special awareness campaigns were organized on eradication of *Parthenium* weed in MGMG village i.e. Chandpalla of Garadpur block of Kendrapara district, Odisha and in IBFI project site at Srimakandpur, Kanas block, Puri district, Odisha. Dr. P.S. Brahmanand, Principal Scientist & Nodal Officer, *Swachh Bharat Abhiyan* coordinated these activities.



Activities during swachhta awareness-cum-cleanliness programs

MERA GAON - MERA GAURAV

Training and interaction meeting organized under adopted villages

Details of program	Place and Date	No. of beneficiary farmers
Farmers' interaction meet on integrated farming system, soil management, fish culture, water management in *rabi* and summer crops, crop diversity and nutritional security, and distribution of *Amaranthus* seeds	Hasim Nagar village February 2, 2019	16
Demonstration-*cum*-training program on vermi-composting	Bhakarsahi village, Balipatana block February 15, 2019	50
Farmers' interaction meet on water management practices for pulse crops	Chandapalla, Kendrapada February 16, 2019	10
Sensitization program on role of farm women in agricultural water management	Deras Research Farm, Khurda March 8, 2019	43
Scientists-Farmers interaction meeting on water management practices for vegetable crops	Naindipur, Kendrapada March 16, 2019	13
Farmer's meeting on *kharif* crop planning	Giringaput & Haridamada, Khurda June 22, 2019	36
Discussion with farmers on drainage of excess water	Khadala, Jagatsinghpur June 29, 2019	9
Farmers' interaction meet on water use efficient practices for summer crops	Chandapalla & Naindipur, Kendrapada June 29, 2019	10


AWARDS, HONOURS & RECOGNITIONS

ICAR BEST INSTITUTE AWARD-2017

ICAR-Indian Institute of Water Management has received **'The Sardar Patel Outstanding ICAR Institution Award-2017'** amongst 'Small Institutes' categoryfor its outstanding performance in the field of agricultural water management research and training. Dr. S.K. Ambast, Director, ICAR-IIWM received this award from Dr. T. Mohapatra, Hon'ble Secretary, DARE & Director General, ICAR on the occasion of *Pusa Krishi Vigyan Mela* organized at ICAR-IARI, New Delhi on March 5, 2019. The award carries a citation, a plaque and cash prize of ₹ 10 lakh.

DR. K.G. TEJWANI AWARD

Dr. K.G. Mandal, Principal Scientist of the Institute has received the prestigious Dr. K.G. Tejwani Award for Management of Natural Resources for the biennial 2016-2017. This award has been conferred by the Indian Association of Soil and Water Conservationists (IASWC), Dehradun during a Conference at Koraput, Odisha.

BKJF-INCSW SOOKSHMA SINCHAI PURASKAR-2018

A team of Scientists comprising of Dr. K.G. Mandal, Dr. R.K. Mohanty, Dr. S. Ghosh, Dr. M. Raychaudhuri, Dr. A. Kumar & Dr. S.K. Ambast of the Institute has received this prestigious award for significant contribution to Participatory Irrigation Water Management and Development of Integrated Farming System models under Kuanria medium irrigation command in Odisha. The certificate, a memento and cash award of ₹ 1.0 lakh have been conferred jointly by the INCSW of Central Water Commission, Ministry of Water Resources, River Development & Ganga Rejuvenation, Govt. of India and the Bhavarlal & Kantabai Jain Foundation (BKJF), Jalgaon.

K.C. DAS MEMORIAL AWARD

A team of Scientists from ICAR-Indian Institute of Water Management, Bhubaneswar comprising of Dr. S. Mohanty, Dr. K. G. Mandal, Dr. S. K. Rautaray, Dr. R. K. Mohanty, Dr. B. Behera and Dr. S. K. Ambast has received the K.C. Das Memorial Award for best research paper in the field of Agricultural Engineering from the Institution of Engineers (India), Odisha State Centre. The Award was given on 30th March 2019 on the occasion of 60th Annual Technical Session of the Institution of Engineers (India). Governor of Odisha, Professor Ganeshi Lal graced the inaugural session of the function as the Chief Guest and addressed the delegates.

BEST FARMER AWARD TO FARMERS FIRST PROJECT WOMEN FARMER

One woman farmer under Farmers FIRST Project of ICAR-IIWM has received the 'Best Farmer' award for her innovative role in using and popularizing sprinkler irrigation in vegetable cultivation. Smt. Meena Mohanta of Khuntapingu village, Block Saharpada, district Keonjhar has received this award by the Hon'ble Union Minister of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh Ji during the 'State-level *Kisan Mela*' organized at ICAR-NRRI, Cuttack on February 26, 2019.

- Dr. P.S. Brahmanand, Principal Scientist has received the 'Leadership Award-2018' of Soil Conservation Society of India for his significant contribution to research on soil and water conservation. Shri Banwarilal Purohit, Hon'ble Governor, Govt. of Tamil Nadu was the Chief-Guest and conferred this award during a National Conference at Ooty, Tamil Nadu on January 31, 2019.

- Dr. A. Mishra, Dr. S.K. Rautray, Mr. Abhishek Waghye and Dr. C. Chatterjee have received the 'Banabihari Mohanty Memorial Award' ofthe Institution of Engineers (India), Odisha State Centre, Bhubaneswar during the 60th Annual Technical Session on March 30, 2019 for the paper entitled 'Rainwater management in mango orchards through micro-catchments'.

- Dr. P.K. Panda, Dr. R.K. Mohanty, Dr. P. Panigrahi and Dr. S.K. Ambast received the 'Best Poster Award' in the Conference on Farmers First for Conserving Soil and Water Resources in Eastern Region at ICAR-IISWC Regional Centre, Koraput, Odisha during February 6-8, 2019 for the paper entitled 'Water resource conservation and its management in rainfed area for doubling farm income'.

- Dr. K.G. Mandal, Principal Scientist was invited to deliver a lead lecture on 'Efficient Water Management: Key to Sustainability in Crop Production' in the Agriculture and Forestry Sciences Section of the 106th Indian Science Congress at the Lovely Professional University (LPU), Jalandhar during January 3-7, 2019.

- Dr. M. Raychaudhuri, Principal Scientist has been invited to deliver lead lecture on 'Agribusiness Ventures to Sustain Irrigation Water and Soil Health in Indian Agriculture' in the technical session Theme 2: 'Agribusiness venture: Track 1 Agriculture, Horticulture, Forestry and Food Processing' at ICAR Research Complex for NEH region, Umiam, Meghalaya on February 11, 2019.

- Dr. S. Raychaudhuri, Principal Scientist has been nominated for presentation in Science Communicator's Meet in the 106th Indian Science Congress at Lovely professional University, Jalandhar during January 3-7, 2019.

- Dr. P.S. Brahmanand, Principal Scientist has been invited to talk on 'Ideology of Swami Vivekananda and Its Relevance to Present Society' on the occasion of National Youth Day at Vivekananda Siksha Kendra, Bhubaneswar on January 12, 2018.

- Dr. M. Raychaudhuri, Principal Scientist has been invited as Sectional Recorder of the Agriculture and Forestry Sciences section in the 106th Indian Science Congress at Lovely Professional University, Jalandhar during January 3-7, 2019.

- Dr. M. Raychaudhuri, Principal Scientist has been nominated as an expert member of selection committee for the posts of SMS (Soil Science) at Dr. RPCAU, Pusa, Bihar on February 26, 2019.

- Dr. S.K. Rautaray, Principal Scientist, has been nominated by ICAR as member, Institute Management Committee (IMC) of ICAR-ATARI, Bengaluru.

DEPUTATION ABROAD

Dr. A.K. Thakur, Principal Scientist, was invited to present his research work and as an external examiner for Ph.D. Thesis defense at Wageningen University and Research (WUR), The Netherlands during March 4-8, 2019.

DD KISAN/ RADIO TALK

- Dr. P. Nanda and Dr. P.K. Panda participated as an expert in the panel discussion on '*Samastanka Pain Jala Surakhya*' (Ensuring Water Security for All) on the occasion of World Water Day on March 19, 2019 on Doordarshan.
- Dr. P.K. Panda, Principal Scientist of this institute delivered a radio talk on 'Aim and objective of world water day celebration' on March 22, 2019 at All India Radio, Cuttack.
- Dr. P.K. Panda, Principal Scientist, participated as an expert in 'Live Phone in' program on '*Paribesa Pradusana O Tara Pratikar*' (Environmental pollution and its control) on the occasion of World Environment Day at All India Radio, Cuttack on June 5, 2019.
- Dr. P.K. Panda, Principal Scientist, participated as an expert in 'Live Phone in' program on '*Kharif Chasaru Adhika Labha Utpadana Kariba Kipari*' (How to get higher profit from *kharif* cultivation) at All India Radio, Cuttack on June14, 2019.
- Dr. P.K. Panda, Principal Scientist, delivered a radio talk on '*Jalabayu Paribartana Pariprekhire Samnnita Krushi Parichalana*' (Integrated agriculture management under climate change context) at All India Radio, Cuttack on June 18, 2019.

JOINING

Mr. Sitesh Kumar Mohapatra, joined ICAR-IIWM as Technical Assistant (T-3) Farm on January 23, 2019 (FN).