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IN THIS ISSUE





DIRECTOR'S COLUMN

Blue Sky Research and Road Map in Agricultural Water Management

Blue sky research refers to innovative and potentially ground-breaking research projects focused on developing new protocols and technologies pertaining to agricultural water management. Our Country is witnessing the results pertaining to mass awareness initiatives on enhancing agricultural water productivity and saving of water through different schemes in operation by Government of India. Stakeholders are disseminated with the use of modern tools and techniques pertaining to sensor-based irrigation scheduling for different crops, groundwater recharge technologies, management of drought, flood, waterlogged and coastal ecosystems, automation of canal systems and flexi check dams, wastewater use in agriculture, climate resilient technologies etc. However, we need to prepare a road map for ensuring the dissemination of potential technologies besides undertaking innovation in research to ascertain judicious use of water under changing climate scenarios. There is an urgent need to enhance the water use efficiency from the present level of 30-40% to 60% ensuring to fulfil the additional irrigation water requirement of 40% from present level of 675 BCM to 944 BCM in 2050. Under such situation, it becomes imperative to validate the developed integrated soil moisture and water depth sensing systems at different locations for different crops; standardize groundwater recharge technologies, investigate the impact of canal automation, evaluate the best management practices for reclamation of drought, flood, waterlogged and coastal regions to enhance the agricultural water productivity through pilot field demonstrations and upscale micro irrigation technologies and crop diversification. Besides this, ICAR-IIWM has taken up research initiatives on development of protocols for carbon credit computation under water saving scenarios to contribute to the voluntary carbon market (VCM), ecosystem services, water and nutrient management using AI/ML in open fields and under hydroponics and aquaponics systems in poly houses, crop-water demand based canal rostering and operation of canal automation systems; use of geospatial and model fusion technologies to identify water bodies pan India and target the potential location of water harvesting structures, Integrated modelling framework for prediction of future water requirement of different crops under changing climate, standardization of protocols for water footprint based crop water budgeting, novel bio-polymer based products for improving water and nutrient use efficiency, nutritional water productivity in aquaculture and the use of sub-surface drip irrigation in different crops besides integrated sensing systems for irrigation scheduling in different crops. The proposed road map takes care of the

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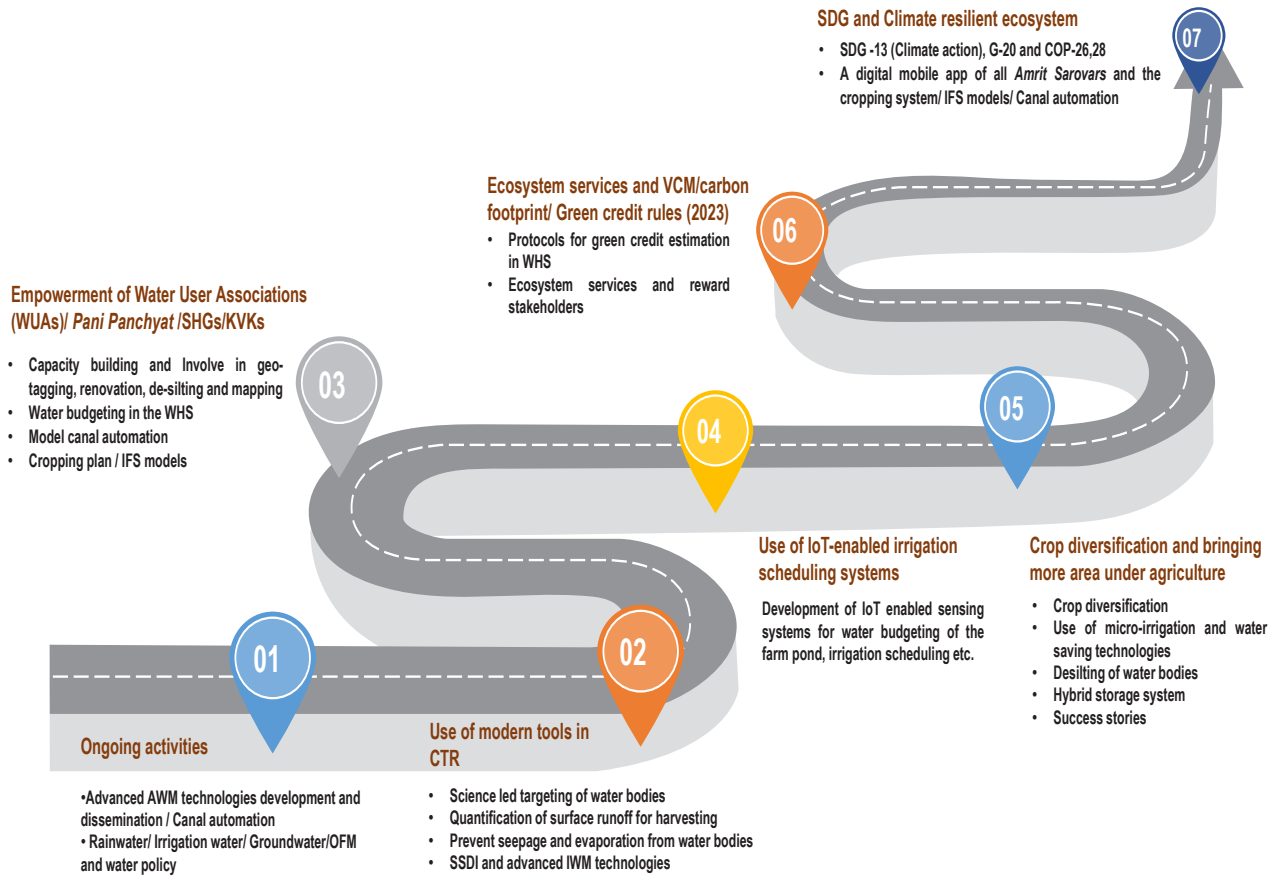
Roadmap of ICAR-IIWM, Bhubaneswar, Odisha



innovating research activities besides the outreach programmes empowering the WUAs, SHGs and KVKs through capacity building programmes and pilot field demonstration of developed technologies.

During the period of last six months, technologies developed by the Institute were disseminated under TSP, SCSP, Farmers FIRST, MGMG, *krishi melas* etc. besides the capacity building programmes undertaken at different locations. Research papers were published in peer reviewed journals and the students of OUAT and ICAR-IARI through ICAR-CRRI hub were guided by the faculty of the Institute. Projects submitted by the Institute for external funding from different funding agencies were approved and eight technologies were certified by NRM division of ICAR besides copyright of technologies by AICRP on IWM centres. The sixth QRT report for the period from 2018-2023 was submitted to the Council following six meetings and field visits by the QRT team at the Institute and AICRP on IWM centres. Scientists and staff of the Institute were able to expand their knowledge and motivated by visit of eminent personalities and academicians including Hon'ble Secretary DARE and DG, ICAR, DDG (NRM), ADG (AAFCC) of ICAR, Hon'ble Members of Parliament and MLA, Directors of ICAR Institutes and Chairman and Members of QRT. Besides this, several programmes as desired by the Council and Government of India in form of awarness campaigns were also organized.

RESEARCH ACHIEVEMENTS

Efficient Water Management Strategies Using Resource Conservation Technologies in Maize-Sunflower Cropping System

A field experiment conducted during *kharif* 2023 and *rabi* 2023-2024 to study the effect of resource conservation technologies using various irrigation methods and preceding sunflower and maize residue, respectively on growth, yield and water productivity of maize (sweet corn) and sunflower crops. The experiment was laid out in a randomized block design with four replications and ten treatments. The treatments include permanent broad-bed furrow irrigation (PBBF), permanent broad-bed furrow irrigation with residue (PBBF+R), permanent narrow-bed furrow irrigation (PNBF), permanent narrow-bed furrow irrigation with residue (PNBF+R), zero-till surface drip irrigation (ZTDI), zero-till surface drip irrigation with residue (ZTDI+R), zero-till sub-surface drip irrigation (ZTSDI), zero-till sub-surface drip irrigation with residue (ZTSDI+R), zero-till flatbed flood irrigation with residue (ZTFBF+R), conventional till flatbed furrow irrigation (CTFBF+R). The sweet corn variety "*Sugar* 75" with the recommended package of practices was grown during *kharif* season. The maize cob yield was highest under PBBF+R (11.48 t/ha) while the cob yield of BBF+R was statistically at par with in ZTSDI+R, ZTSDI, ZTDI+R, ZTDI,

PBBF, PNBF+R and PNBF. The cob yield of ZTSDI+R was 16% and 17% higher than the ZTFBF+R and CTFBF treatments, respectively. The cob yield of ZTFBF+R and CTFBF treatments were statistically ($p<0.05$) at par. The retention of preceding sunflower residue resulted in no differences in maize output across treatments. The highest water use (671 mm) was observed in CTFBF. The highest cob yield and lowest water use resulted in the highest water productivity (20.15 kg/ha-mm) in PBBF+R which was 16% and 17% higher ($p<0.05$) than that in ZTFBF+R and CTFBF, respectively. The water productivity of PBBF+R was statistically at par with ZTSDI+R, ZTSDI, ZTDI+R, ZTDI, PBBF, PNBF+R and PNBF. The retention of the preceding sunflower residue didn't significantly increase the crop water productivity under different irrigation methods. After sweet corn, sunflower (DRSH-1) was grown with the recommended package practices during *rabi* 2023-2024 season. The sunflower seed yield was the highest under ZTSDI+R (2.16 t/ha) while the seed yield of ZTSDI+R was statistically at par with ZTSDI, ZTDI+R and ZTDI. The seed yield was lowest in CTFBF (1.51 t/ha). There was no significant yield difference between PNBF+R, PNBF, PBBF+R, PBBF, ZTFBF+R and CTFBF treatments. The ZTSDI+R provided 43% higher yield as compared to CTFBF and the water use varied between 305-529 mm under various treatments. The lowest (305 mm) and highest (529 mm) water use was recorded in ZTSDI+R and in CTFBF treatments, respectively. The highest seed yield and the lowest water use under the ZTSDI+R led to the highest water productivity (7.07 kg/ha-mm) and the ZTSDI+R resulted in 26%, 41%, 41%, 70%, 68%, 95%, 111% and 148% higher crop water productivity as compared to the ZTDI+R, ZTDI, PBBF+R, PBBF, PNBF+R, PNBF, ZTFBF and CTFBF, respectively.

(S. Pradhan, P. Panigrahi, K.K. Bandyopadhyay and Ankhila R.H.)

Spatio-Temporal Estimation of Water Footprint at Regional Scale (Odisha)

The district-wise analysis of water footprints in Odisha for 2009, 2013, 2017, and 2021 highlighted significant variations in green and blue water footprints across different districts, driven by factors like crop yields, rainfall, and water management practices. In 2009, Jharsuguda, Sambalpur, and Sundergarh districts recorded the highest water footprints, with total values ranging between 1293.3 to 6445.9 m^3/t. These districts had lower crop yields, leading to higher water requirements, especially in blue water (irrigation). Conversely, districts like Angul, Balasore, and Khordha had relatively lower water footprints due to better crop yields and efficient water use. In 2013, a similar spatial distribution was observed, though certain regions like Ganjam showed higher water footprints due to lower yields despite increased rainfall. The total water footprints ranged from 674.60 to 6886.51 m^3/t, with green water being the majority. In 2017, districts in the North-West Odisha, such as Bargarh, Nuapada, and Sambalpur, showed increased green and blue water footprints due to low crop yield. However, areas with higher rainfall, particularly in the South-East, exhibited decreasing water footprints. By 2021, an apparent reduction in water footprints was noted, with values ranging between 766.75 to 5301.53 m^3/t which might be due to improved crop yield and reduced water evapotranspiration, thus decreasing green and blue water footprints in most of the districts, including Angul, Balasore, and Khordha. This indicates that water management improvements and better crop productivity results in more efficient water use for rice cultivation.

In summary, Odisha's water footprint trends reflect the combined impact of rainfall, crop yields, and water management. There has been a noticeable decrease in water footprints in recent years, particularly in districts with improved agricultural practices and higher rainfall.

(R.K. Jena, R. R. Sethi, U.K. Pradhan and S. Khedikar)

EVENTS, NEWS & CELEBRATIONS

ICAR-IIWM Conducted AICRP on IWM Biennial Workshop

The Biennial Workshop of AICRP on Irrigation Water Management was organized at ANDUAT, Ayodhya in collaboration with ICAR-Indian Institute of Water Management, Bhubaneswar during July 2-4, 2024. Honorable Deputy Director General (NRM), ICAR, Dr. S. K. Chaudhari graced the Inaugural session of the workshop as Chief Guest and Honorable Vice Chancellor, ANDUAT, Dr. Bijendra Singh presided over. Dr. S. Mohanty, Principal Scientist, Project Coordinating Unit presented the activities of AICRP on IWM. During the three-day period, research achievements of the 26 AICRP centers for the year 2023-24 were presented by the respective Chief Scientists in seven technical sessions. New research proposals were also presented during the meeting. Technical experts Dr. D. K. Sharma, Dr. S. D. Gorantiwar, and Dr. R. K. Nema chaired different technical sessions. The experts along with Dr. A. Velmurugan, ADG (SWM) and Dr. A. Sarangi, Director, ICAR-IIWM provided corrective suggestions for the improvement of research programs. In the valedictory session, Dr. Bijendra Singh, Honourable Vice Chancellor, ANDUAT presided over the meeting. Dr. A. K. Singh, Chief Scientist acted as the local coordinator from AICRP Centre at Ayodhya.

ICAR-IIWM Signed MoU

To facilitate collaborative research and student training, ICAR-IIWM and KIIT University, Bhubaneswar, signed an MoU on July 09, 2024.

ICAR-IIWM Organized Interaction Meeting

An interaction meeting was organized on August 2, 2024 with Watershed development team members and other stakeholders in presence of Project Director, Nayagarh, Odisha under REWARD project.

ICAR-IIWM Organized QRT Meeting

The 1st meeting of the 6th QRT was organized at ICAR-IIWM, Bhubaneswar during August 8-9, 2024 under the Chairmanship of Dr. V.N. Sharda, Former Member, ASRB. Other QRT members present were Dr. S. N. Panda, Dr. D.K. Sharma, Dr. B.D. Bhakare, Dr. Uday Khodke and Dr Ranjit Kumar.

The 2nd meeting of the 6th QRT was organized at TNAU, Coimbatore during August 26-27, 2024. The QRT team reviewed the research activities of the following coordinating centres of AICRP on Irrigation Water Management (AICRP IWM): i) Coimbatore (including Madurai and Bhavanisagar), Tamil Nadu; ii) Chalakudy, Kerala; and iii) Arabhavi, Karnataka.

The 3rd meeting of the 6th QRT was organized at MPKV, Rahuri during September 23-25, 2024. The QRT team reviewed the research activities of the following coordinating centres of AICRP IWM: i) Rahuri, Maharashtra; ii) Dapoli, Maharashtra; iii) Parbhani, Maharashtra; iv) Navsari, Gujarat; and v) Junagadh, Gujarat.

ICAR-IIWM also conducted Farmers-Scientists Interaction Meet cum Field Monitoring Visit by QRT led by Dr. V.N. Sharda, Chairman with other members, Director of the Institute and project scientists at Haridamada village on October 8, 2024. The team visited farmers' fields and observed various demonstration units such as mini-IFS model, HYV paddy fields, rainy season hybrid vegetable cultivation, vegetables in broad bed and furrow, optimum dike height structures in rice fields etc. and interacted with over fifty beneficiary farmers and farm women. Later, a special plantation drive under the campaign "*Ek Ped Maa Ke Naam*" was organized involving planting of mango saplings by the dignitaries in the orchard of an adopted farmer.

The 4th meeting of the 6th QRT was organized at ICAR-IIWM, Bhubaneswar during October 7-8, 2024. The QRT team reviewed the research activities of the following coordinating centres of AICRP IWM: i) Chipilima, Odisha; ii) Gayeshpur, West Bengal; iii) Jorhat, Assam; (iv) Pusa, Bihar; (v) Raipur (including Bilaspur), Chattisgarh; and (vi) Shillong, Meghalaya

The 5th meeting of the 6th QRT was organized at PAU, Ludhiana during October 21-22, 2024. The QRT team reviewed the research activities of the following coordinating centres of AICRP IWM: i) Almora, Uttarakhand; ii) Hisar, Haryana; iii) Jammu, J & K; iv) Ludhiana (including Bathinda), Punjab; v) Palampur, Himachal Pradesh; (vi) Pantnagar, Uttarakhand; and (vii) Sri Ganganagar, Rajasthan.

The 6th meeting of the 6th QRT was organized at MPUAT, Udaipur, Rajasthan during October 24-26, 2024. The QRT team reviewed the research activities of the following coordinating centres of AICRP on Irrigation Water Management. (i) Ayodhya, Uttar Pradesh; (ii) Jabalpur, Madhya Pradesh; (iii) Morena, Madhya Pradesh; (iv) Kota, Rajasthan; and (v) Udaipur, Rajasthan.

ICAR-IIWM Organized Meeting on Machine Learning

A meeting was held in hybrid mode on August 12, 2024 to discuss machine learning algorithms, storing historical data in AWS cloud, and visualizing data for irrigation scheduling in the Raspberry Pi microprocessor for the developed soil moisture sensing system and automated alternate wetting and drying system in rice crop. The meeting was coordinated in presence of Dr A. Bandyopadhyay, Chairman, Technical Advisory Committee, ICAR-NePPA, Dr. Arjamadutta Sarangi, Director, ICAR-IIWM, Dr. S.N. Mandal, Associate Professor, Govt. Engineering College, Kalyani, West Bengal and the members of ICAR-IIWM NePPA team.

ICAR-IIWM Celebrated 77th Independence Day

ICAR-IIWM, Bhubaneswar celebrated 77th Independence Day on August 15, 2024. A plantation drive was organized in the Institute campus under the program "*Ek Ped Maa Ke Naam*" wherein, staff members planted coconut and sapota saplings in the Institute main campus as well as at the Deras Research Farm, Mendhasal.

ICAR-IIWM Observed 19th Parthenium Awareness Week

ICAR-Indian Institute of Water Management observed the 19th *Parthenium* Awareness Week during August 16-22, 2024. The banners and posters were displayed, and awareness campaign was conducted at Saraswati *Sishu Mandir*, Bhimtangi, Bhubaneswar, ICAR-IIWM Research Farm, Mendhasal, Farmers FIRST adopted village (*Jamujhari*) and SCSP adopted village (Garedipanchana). ICAR-IIWM staff actively participated in the uprooting of *Parthenium* and cleaning the office premises. The week-long program was coordinated by Dr. Dibakar Ghosh, Dr. Ankita Jha, Dr. Ashish Jadhav and Dr. S.K. Karna.

ICAR-IIWM Installed Water Measuring Device

An open channel water measuring device was installed at Phulnakhara distributary of Puri Canal on August 19, 2024 under the project "Pilot field demonstration of IoT enabled digital water measuring device and soil moisture sensing system for irrigation scheduling in canal commands of Odisha" sponsored by CAD&WM, Dept. of Govt. of Odisha.

ICAR-IIWM Conducted Student Internship Programme

Two 4th Year B.Sc. (Ag) Honours students from the Institute of Agricultural Sciences, SOA University, Bhubaneswar underwent "Two months Unit Attachment Programme" (UAP/ Internship Programme) at ICAR-IIWM during September 9 to November 20, 2024. During the programme, they were exposed to ICAR-NRRI, Cuttack; Odisha State Seed Corporation Ltd, Bhubaneswar; Odisha Agro-Industries Corporation Ltd, Bhubaneswar; OMFED Milk Processing Plant, Bhubaneswar; Centre of Excellence in Horticulture, Mendhasal, Khordha and one start-up '*E-Panipuri kartz*' Bhubaneswar under the 'Agro-Industrial Visits'; besides, visit to the Institute Research Farm and Technology Park. Dr. A.

Sarangi, Dr. S.K. Mishra, Dr. P. Sahu and Dr. R.K. Jena coordinated the programme.

ICAR-IIWM Observed Hindi *Pakhwada*

ICAR-IIWM observed *Hindi Pakhwada* from September 17-30, 2024. Dr. Arjamadutta Sarangi, Director administered the *Rajbhasha* pledge to all the staff members. As part of *hindi pakhwada*, various competitions such as debate, speech, essay, noting and drafting, hindi typing etc. were organized among the staff members. An online Hindi workshop was conducted for the staff members on September 27, 2024 in which Shri Ram Dayal Sharma, Joint Director (OL), ICAR, New Delhi delivered a lecture on "भारतीय संविधान में राजभाषा हिन्दी :नियम एवं अधिनियम". Dr O.P. Verma, Principal Scientist & Mr. K.K. Sharma, TA coordinated the program.

ICAR-IIWM Celebrated *Swachhta Hi Seva*

As per Govt. of India directives, the Institute celebrated *Swachhta Hi Seva* during September 17 to October 2, 2024. Dr. Himanshu Pathak, Hon'ble Secretary, DARE & DG, ICAR administered *Swachhta Pledge* virtually to all staff across ICAR establishments in the country including ICAR-IIWM. Dr. Arjamadutta Sarangi, Director, ICAR-IIWM advised all staff and scholars to work religiously adhering to the guidelines of the Govt. of India to make our campus and surroundings clean and green and for wide-spread advocacy of *Swachh Bharat Abhiyan* objectives. During the period, different cleanliness drives, and awareness campaigns were conducted at different forums (schools, temples and nearby villages). A special plantation drive was organized at ICAR-IIWM Research Farm, Mendhasal by planting over 120 plants of mango and papaya. A preventive health check-up camp '*Safai Mitra Suraksha Shivir*' was organized by ICAR-IIWM, especially to benefit the sanitation, housekeeping and garden staff & their family members wherein, over ninety *Safai Mitras*, office staff and their family members got benefited. The symbolic event of a 'Human Chain' was formed where all staff and scholars of the Institute joined hands to raise awareness and demonstrate commitment to cleanliness and sanitation.

ICAR-IIWM Installed IoT-enabled Solar-powered Water Level Sensing System for AWD

ICAR-IIWM installed IoT-enabled solar-powered water level sensing system for AWD in paddy at ICAR-IARI New Delhi, on September 19, 2024 in the NePPA experimental field (sub-surface drip irrigation of maize) of ICAR-IARI, New Delhi. In addition to installation, the team NePPA from ICAR-IARI, New Delhi was trained regarding the operation and maintenance of the system. This system can assess volumetric soil moisture content in real time, allowing for more precise irrigation while conserving water and labour.

IIWM Organized "Special Campaign 4.0" under *Swachh Bharat Abhiyan*

As per Govt. of India directives, ICAR-IIWM, Bhubaneswar organized "Special Campaign 4.0 of *Swachh Bharat Abhiyan* from October 2-31, 2024. During the campaign, scientists, staff members, project staff including contractual staff participated in cleaning the office premises and Deras Research Farm,

Mendhasal. As per the guidelines of the Special Campaign 4.0, the Condemnation and Auction Committee of the Institute undertook a special public auction following codal formalities to dispose of condemned store items of Institute Research Farm.

A cleanliness drive was also conducted in the Garedipanchana (Bhoi Sahi) SCSP-adopted village of Balipatna block, Khordha district wherein; the coordinating team sensitized the villagers on swachhata and emphasized on general cleanliness of residential houses as well as public places.

ICAR-IIWM Observed Vigilance Awareness Week

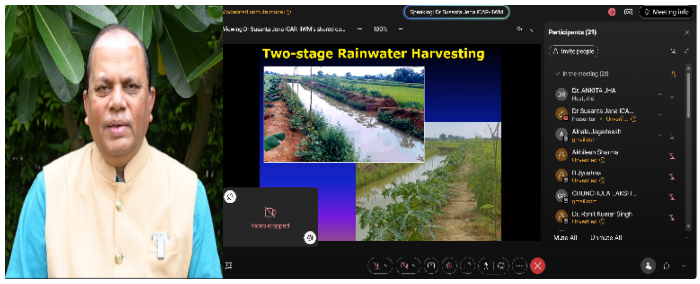
Vigilance Awareness Week was observed at ICAR-IIWM, Bhubaneswar from October 28 - November 3, 2024. Initially, Integrity Pledge was administered by the Director to all the staff members on October 28, 2024. "Various Awareness meetings were held at Arihan village, Goudkera Panchayat, Puri Sadar Block and schools (Jageswari ME School and Vivekanand Siksha Sansthan, BDA Colony, Bhubaneswar). An essay writing competition was organized among the staff of IIWM and among the school children of Vivekanand Siksha Sansthan, BDA Colony, Bhubaneswar. On November 4, 2024, Er K.C. Mohanty, Chief Engineer and Internal Vigilance Officer, Department of Water Resources, Govt. of Odisha delivered a talk on "Vigilance in Govt. Departments" with examples and sharing experiences. Certificates and prizes were awarded to the winners of different competitions. The awareness week was organized by Dr S.K. Rautaray, Vigilance Officer of the Institute, Dr. O.P. Verma, Principal Scientist, Sh. S.K. Jena, Administrative Officer, Sh. J. Biswal, Finance and Accounts Officer and Sh. Anand Gaurav, Technician.

ICAR-IIWM Organized Brainstorming Workshop

A brainstorming workshop on Reclamation and management of the waterlogged area for enhancing the livelihood of stakeholders in the *Delang* block of Puri district, Odisha was organized on November 23, 2024. The Chief Guest was Hon. Dr. Sambit Patra, MP (Lok Sabha), Puri, and Hon. Shri Ashrit Pattanayak, MLA (Pipli-Delang), Puri graced as guest of Honour. Director of ICAR-IIWM, Dr A. Sarangi facilitated organization of the workshop as per the request of Hon'ble MLA to assist the stakeholders in taking up measures to alleviate the problem faced by beneficiaries of the region. The workshop was attended by 20 scientists and staff of ICAR-IIWM, scientists of six sister ICAR Institutes in the region besides Dr R.N. Sahoo, PS and PI of NePPA from ICAR-IARI; faculties of OUAT and the Head KVK, Sakhigopal; EIC of DoWR and CEs of DoWR, Irrigation and Drainage and CADWM Departments; progressive farmers of the regions and office bearers of *Pipli Sanskritika Parishad* and media representatives. Drs S.K. Rautaray, S.K. Jena, R.K. Mohanty, and A.K. Thakur, Principal Scientist presented the overview of the soil, hydrology and agricultural practices in the waterlogged site with the possible interventions for enhancing farm income.

ICAR-IIWM Organized Training Programmes

ICAR-Indian Institute of Water Management, Bhubaneswar organized a virtual training programme on Climate smart agriculture for enhancing system resilience in water management in collaboration with National Institute of Agricultural Extension Management (MANAGE), Hyderabad, Telangana from September 10-13, 2024. The Chief Guest of the inaugural programme was Dr. S.K. Chaudhari, Deputy Director General (Natural Resource Management), ICAR, New Delhi. A total of 25 trainees from different backgrounds such as Scientists, Assistant Professors, Agricultural Extension Officers, SMS, Students and Research Scholars participated in this training programme. Over the course of four days, a total of sixteen lectures led by eminent experts from various parts of India, were delivered and the trainees



were evaluated. In the valedictory session of the training program, Dr. A. Velmurugan, ADG (Soil and Water Management), ICAR, New Delhi served as the Chief Guest and Dr A.Sarangi, Director, ICAR-iIWM acted as the course Director. Dr. Ankita Jha and Dr. Dibakar Ghosh, Scientists, ICAR-IIWM, Bhubaneswar acted as coordinators of this training programme.

Another HRM Training program on "IoT enabled sensing systems and AI/ML application in agricultural water management" was organized by ICAR-IIWM, Bhubaneswar in hybrid mode during November 11-13, 2024. A total of 50 participants from different ICAR Institutes/SAUs/State Agriculture Departments attended the training program. Dr S.K. Rautaray acted as the Course Director whereas Dr. Ashok K. Nayak and Dr. D. Sethi as the Course Coordinators of the training program.

Training Programme for Horticulture Officers and Farmers

ICAR-IIWM organized an eight-day training programme on "Enhancing productivity in horticultural crops through water management technologies" from November 23-30, 2024 in which 22 Horticulture Officers participated. ICAR-IIWM organized two training programs, viz., "Efficient water management and production practices of horticultural crops" from December 4-11, 2024 and "Enhancing productivity in horticultural crops through water management technologies" December 13-20, 2024 for progressive horticulture farmers and Horticulture Extension Personnel of Odisha, respectively. Each training module covered 8 days (5 days of in-house training+3 days of exposure visits). 17 progressive farmers and 24 Horticulture Officers from different districts of Odisha participated during the training program. These training programmes were sponsored by the Directorate of Horticulture, Govt. of Odisha, under the State Plan Scheme. Dr. Prativa Sahu, Scientist and Dr. D.C. Sahoo, Principal Scientist acted as coordinators of this training programme.

A training program cum workshop on "Drone technology and its applications in agriculture" was organized under NePPA project at ICAR-IIWM, Bhubaneswar in collaboration with ICAR-IARI, New Delhi during December 2-3, 2024. Theory followed by practical sessions on drone imaging, image transfer and analysis were conducted at the IIWM Research Farm, Mendhasal. Resource persons from ICAR-IARI, New Delhi; ICAR-NRRI, Cuttack; ICAR-IIWM, Bhubaneswar and drone industry delivered lectures and conducted practical sessions. A total of 65 participants (15 online and 50 offline) comprising of scientists, professors, research scholars and students across the country participated in the training program. Dr S.K. Rautaray and Dr R.N. Sahoo acted as Course Directors and Dr. Ashok K. Nayak and Dr. D. Sethi as the Course Coordinators of the training program.

A one-day Scientist-Stakeholders Workshop on 'Status of flood affected areas of Rapti River Basin and post flood management options under INTEGRATE Project was organized on December 21, 2024 at KVK, Belipar, Gorakhpur, Uttar Pradesh. Dr. S.K. Jena Principal Scientist, Dr. R. K. Jena, and Dr. B. S. Satapathy, Senior Scientist coordinated program.

ICAR-IIWM Celebrated World Soil Day

ICAR-IIWM, Bhubaneswar celebrated World Soil Day on December 5, 2024. About 150 people including 20 farmers and 15 students from different schools attended the program. Dr. A.K. Patra, Former Director, ICAR-IISS, Bhopal delivered a special lecture on the World Soil Day theme "Caring for soils: measure, monitor and manage". Dr. A. Velmurugan, ADG (S&WM), NRM Division, ICAR graced the occasion as Chief Guest and stressed on measuring, monitoring and management of soil health by scientists, policy makers and farmers in an integrated manner. A farmers-scientists interaction meeting on "Improved Soil & Water Management" was conducted under the Chairmanship of Dr. A. Sarangi, Director, ICAR-IIWM, Bhubaneswar. A World Soil Day-themed debate and painting contest was held for the students. The students were rewarded, and the progressive farmers were felicitated.

IMC Meeting at ICAR-IIWM

The Institute Management Committee (IMC) and Quinquennial Review Team (QRT) Interface meeting was organized at ICAR-IIWM, Bhubaneswar on December 10, 2024. After presenting the Institute's accomplishments before the Committee, Dr. A. Sarangi, Director, ICAR-IIWM brought up the agenda issues for discussion.

ICAR-IIWM Celebrated *Swachhta Pakhwada*

As per Govt. of India directives, a fortnight long *Swachhta Pakhwada* (December 16-31, 2024) was inaugurated at ICAR-IIWM on December 16, 2024. In the beginning, *Swachhta* Pledge (*Shapath*) was administered by the Director to all the staff members followed by tree plantation program in the Institute campus. To publicize the objectives of the mission and create awareness among the public, banners were displayed at prominent places of the Institute. A selfie booth was installed in front of the main Institute building with *swachhata*-themed props and backgrounds, where all staff and scholars took their photographs and shared in respective social media platforms to create *swachhta* awareness and sensitize public about the objectives of Swachh Bharat Abhiyan, besides publicizing the brand ICAR-IIWM. A 'Green Drive' was organized as per *Swachhta Pakhwada* guidelines in the MGMG-adopted scheduled castes dominated Bhatabandha village of Nimapara block in Puri district. One hundred grafted mango saplings and fifty nutri-vegetable seed kits were distributed to over fifty participants, majority being women. *Swachhta* awareness cum sensitization programme was organized in the MGMG-adopted Arihan village, Puri district. ICAR-IIWM, Bhubaneswar observed the National Farmers' Day (*Rashtriya Kisan Diwas*) on December 23, 2024 under the *Swachhta Pakhwada* at Hansapada village of Nimapara block in Puri district, Odisha in order to commemorate the birth anniversary of India's fifth Prime Minister Shri Choudhary Charan Singh Ji and to pay tribute for his incredible contributions for the welfare of farming community. A special invited talk on 'How to inculcate Inner Peace, Tranquility and Harmony' was organized December 27, 2024 for the staff of the Institute under the *Swachhta Pakhwada* celebration. The talk was delivered by Swami Maheshatmananda Ji of Ramakrishna Math and Mission, Bhubaneswar as the Guest Speaker. The closing function was graced by Hon'ble MP (Lok Sabha) of Balasore, Shri Pratap Chandra Sarangi Ji as the Chief Guest. The event was organized and coordinated by Dr. S. K. Mishra, Principal Scientist and all members of SBA committee.

ICAR-IIWM Participation in Exhibitions

ICAR-IIWM participated in the Agricultural Exhibition and demonstrated its technologies during the National Fish Farmers' Day celebration at ICAR-CIFA, Bhubaneswar held on July 13, 2024. The program was inaugurated by Dr. Himanshu Pathak, Secretary, DARE & DG, ICAR, and graced by DDG (Fisheries), DDG (Education), ADG (ICT), and Directors/Heads of ICAR institutes. Hundreds of farmers, scientists and other stakeholders visited the stall and were enlightened on IIWM technologies and activities. During the day, two IIWM technologies/products, namely, (i) "IoT-enabled integrated sensor-based irrigation water management with sluice gate control" and (ii) "IoT-enabled capacitance-based soil moisture sensor" were inaugurated by Dr. Himanshu Pathak, Secretary, DARE & DG, ICAR in presence of Dr. Arjamadutta Sarangi, Director, ICAR-IIWM, Bhubaneswar. Dr. S.K. Rautaray, Dr. S.K. Mishra, Dr. D. Ghosh, Dr. D. Sethi, Er. A.K. Nayak, and Mr. S. Lenka demonstrated technologies during the exhibition.

ICAR-IIWM participated in the 96th ICAR Foundation Day & Technology Day Program at National Agricultural Science Complex, New Delhi during July 15-16, 2024. A model on "IoT-enabled integrated sensor-based irrigation water management with sluice gate control" was demonstrated during the programme. The program was inaugurated by Sri Shivraj Singh Chauhan, Hon'ble Union Minister of Agriculture and Farmers' Welfare, Govt. of India in the presence of Dr. Himanshu Pathak, Secretary, DARE & DG ICAR, Dr. S.K. Chaudhari, DDG (NRM) and other DDGs, ADGs, and Directors of different ICAR institutes. Industry representatives and school students also participated in the programme. Twelve Agricultural Water Management technologies developed by ICAR-IIWM; Bhubaneswar were certified by the ICAR during the two-days event. Dr. D. Sethi, Dr. S.K. Karna and Er. K.P. Mishra demonstrated technologies during the exhibition.

The eighth edition of the Indian Mobile Congress (IMC) was held at Bharat Mandapam in New Delhi from October 15-18, 2024. ICAR took part in the exhibition and showcased cutting-edge agricultural technology that incorporates 5G capabilities developed under the ICAR-Network Program on Precision Agriculture (ICAR-NePPA), exhibiting their potential to transform smart farming practices across the country. Many national and international delegates visited the stall, which had a daily footfall of roughly 500-700. Two working models from ICAR-IIWM, Bhubaneswar were exhibited, including the ICAR-IIWM: i) IoT-enabled Smart Soil Moisture Sensor and ii) IoT-enabled Alternate Wetting and Dying Irrigation System. Both technologies were well acknowledged by the delegates, particularly by the International Telecommunication Union (ITU). Dr. Himanshu Pathak, Hon'ble Secretary, DARE & DG, ICAR visited the IMC and the ICAR-IIWM stall on October 18, 2024. Dr. D. Sethi and Er. A.K. Nayak demonstrated technologies during the exhibition.

ICAR-IIWM participated and showcased its technologies and products during the 3rd International conference on 'climate-smart nutri-sensitive integrated farming system for gender-equitable sustainable agriculture: Prospects and challenges (ICNSFS-2024) cum Workshop on technological empowerment and demonstration for SC farm women at ICAR-CIWA, Bhubaneswar during November 6-8, 2024. Dr. S.K. Mishra, Dr. H.K. Dash, Dr. B.K. Sethy, Dr. B.S. Satapathy, Dr. D. Sethi, Er. A.K. Nayak, Mr. S. Lenka, Dr. S.K. Karna and Mr. B.N. Nayak demonstrated technologies during the exhibition.

ICAR-IIWM participated and showcased its technologies and products during the 'Global Soils Conference 2024' on the theme "Caring Soils Beyond Food Security-Climate Change Mitigation & Ecosystem Services" organized by the Indian Society of Soil Science during November 19-22, 2024 at NASC Complex, New Delhi. Dr. O.P. Verma, Principal Scientist and Dr. D. Sethi, Scientist demonstrated technologies during the exhibition.

ICAR-IIWM participated and showcased its technologies and products during the 3rd Indian Rice Congress-2024 held at ICAR-NRRI, Cuttack during December 5-7, 2024. Dr. S.K. Mishra, Dr. B.K. Sethy, Dr. O.P. Verma, Dr. D. Ghosh, Dr. R.K. Jena, Er. A.K. Nayak, Er. Ashish M. Jadhav and Mr. S. Lenka demonstrated technologies during the exhibition.

ICAR-IIWM participated and showcased its technologies and products in the 15th National Krishi Fair-2024 held at Puri during 21-25 December 2024. Dr. P.K. Panda, Dr. O.P. Verma, Dr. S. Pradhan, Er. A.K. Nayak, Er. Ashish M. Jadhav, Dr. S.K. Karna, Mr. Anand Gaurav and Mr. B.N. Nayak demonstrated technologies during the exhibition.

OUTREACH ACTIVITIES

Activities under *Mera Gaon-Mera Gaurav* (MGMG)

Under MGMG, farmers' interaction program was organized in *Balanga* village of Puri district. 50 women farmers from five nearby villages participated in the program. Grafted mango saplings of *Amrapali* variety and kitchen garden kits for *rabi* season were distributed among the women farmers. One-day training programme on "Crop intensification and diversification through *rabi* season vegetables cultivation and aquaculture for enhancing water productivity" was conducted on December 6, 2024 at two clusters of villages in Kantapada block of Cuttack district. Dr. R.K. Mohanty, Dr. S. Mohanty, Dr. R.K. Jena and Dr. Prativa Sahu coordinated the program.

Activities Under SCSP Project

To bring in crop diversification and improve income of farmers, more than 30.0 q of seeds of high value crops and 40.0 q of paddy seeds (var. *CR Dhan 800, 801,802*) were distributed among 250 farmers in 06 villages of Nimapara and Balipatana block under SCSP. Further, to improve access of farm families to vegetables, kitchen garden vegetable seed kits containing 12 vegetable seeds were distributed to 450 women farmers during the period. A total of 2.0 q vegetable seeds and other critical inputs like water soluble fertilizer, neem oil etc. were distributed to farmers Balipatana, Nimapara, Dhenkanal and Bhawanipatna villages. In order to ease the burden of land preparation, intercultural operation, two (2) power mini weeders of 1.5 hp capacity, two (2) power weeders of 7.0 hp capacity, one power tiller 2000 sq.mt of shade net, 1500 sq.mt of plastic cladding film for protected cultivation structure, 540 mt (90 number of 6 m each) of HDPE sprinkler pipes, 450 mt of HDPE conveyance pipes, fittings of sprinkler irrigation (including riser and sprinkler, end caps, Qc bend, Tee, pump connectors etc), were distributed to farmers of Hansapada and Villigram villages of Nimapara block.

Activities Under Farmers' FIRST Project

Under the Farmers' FIRST Project, various research and extension activities were undertaken in an adopted village cluster in Khordha district of Odisha comprising three tribal dominated villages namely, *Haridamada*, *Barapita* and *Jamujhari* having 408 households. In order to build up farmers' capacity in advanced farming and water management practices, four skill-based training cum demonstration programmes were conducted covering various crop, enterprise and water management technologies benefiting 215 farmers and farm women. Under the Crop-based module, demonstrations on high yielding paddy were conducted in *kharif* rice with three certified varieties namely, 'MTU 1061, MTU 7029 and *Mrunalini* in 75.0 acres benefiting 100 farmers. For conducting field demonstrations, critical inputs were provided to farmers, like 12.0q paddy seeds (*var.* MTU 1061-6.0q, MTU 7029-3.0q and *Mrunalini*-3.0q), green gram seeds (var: *Sikha*)-80 kg; *Rhizobium* culture-4 kg; 07 types of rainy season and 09 types of *rabi* season hybrid vegetable seeds, IIHR nutri-garden seed kits-150 nos., pro-trays-100 nos., coco-peat-20 kg; coconut saplings-60 nos. and papaya saplings-80 nos. (var. *Red Lady*), pump set-4 nos. with irrigation pipes (3.2 HP-3 nos., 5 HP-1 no.), NRRI-Endo-N-Tech liquid bio-fertilizer-15 lt. to cover 60 acres of transplanted paddy, neem oil-10 lt., paddy straw mushroom spawns-300 bottles, oyster straw mushroom spawns-200 bottles with required polythene sheets; fish seeds-3500 nos. (catla-2000, rohu-900 and mrigal-600), 2 vermi-beds with 1 kg worm and need-based pesticides benefiting over 950 beneficiary farmers and farmwomen, besides continuous monitoring, conducting field days and providing technical backstopping. In addition, three extension folders on (i) mushroom cultivation (ii) vermi-composting (iii) nutri-gardening were printed in local language for distribution to farmers.

Activities Under Tribal Sub Plan

Exposure visits on water management in cotton crops and maize crops were organized at Khaira village in Gunupur, Rayagada and Phatachanchada village in Gajapati, respectively. Similarly, training programmes on adoption of SRI technique in paddy crops were conducted in both the villages (Khaira village: total 113 participants and Phatachanchada village: total 96 participants). Farm inputs [550 nos. of mango saplings (*Amrapalli vr.*), 150 litres of liquid Bio fertilizer and 3 nos. of 2 HP water pumps] were distributed at Khaira village, in which 108 tribal farmers got benefited. Similarly, farm inputs [450 nos. of mango saplings, 100 litres of liquid Bio fertilizer, 2 nos. of 2 HP water pumps and barbed fencing (7 bundles i.e., 227 kg)] were distributed at Phatachanchada village, in which 102 tribal farmers got benefited. Upon further request by the farmers for tuber crops, sweet potato cuttings (50,000 nos.) were provided to the farmers of both the villages. To bring diversification, a farm pond was developed at Phatachanchada village on community basis and an integrated farming system (IFS) model is also being aimed at.

Installation and Demonstration of ICAR-IIWM Developed IoT-enabled Soil Moisture Sensor

Installation and demonstration of ICAR-IIWM developed IoT-enabled soil moisture sensor was carried out in ICAR-CICR Research station, Hisar, Haryana on June 20, 2024, in ICAR-IARI, New Delhi on September 19, 2024.

CAPACITY BUILDING & TRAININGS

Training and Capacity Building of ICAR- Employees

Official & Designation	Subject	Organization	Period
Dr. S. Mohanty and Dr. B. K. Sethy	Capacity sharing program on 'Integrated storage mapping using earth observation data and data analytics approach	Hyderabad	November 25, 2024.
Er. Ashish M. Jadhav	Smart digital tools for sustainable agriculture	ICAR-CRIDA, Hyderabad	October 15-24, 2024
Er. Ashish M. Jadhav	HRM-Training on 'IoT Enabled Sensing Systems and AI/ML Application in Agricultural Water Management'	ICAR-IIWM, Bhubaneswar	November 11-13, 2024
Er. Ashish M. Jadhav	On field training program on 'Drone Technology & its Applications in Agriculture'	ICAR-IIWM, Bhubaneswar	December 2-3, 2024
Er. Ajit K. Nayak	Indian Mobile Congress-2024	Department of Telecommunication, Govt of India	October 15-18, 2024
All Scientists and Administrative staffs	ITMC meeting for finalization of IPR proposals (patent, copyright, trademark etc.)	ICAR-IIWM, Bhubaneswar	December 24, 2024

Trainings / Programs Organized for the Farmers by ICAR-IIWM

Subject	Place	Period	Participants
Awareness program on "Importance of groundwater recharge on agriculture"	Sajanapada, Nayagarh	July 05, 2024	104
Training cum demonstration on "Paddy seedling root dip treatment with the endophytic bio-fertilizer *Azotobactor chroococcum* (NRRI-Endo-N-Tech) for fixation of atmospheric nitrogen"	Haridamada, Jamujhari & Barapita, Khordha	August 20, 2024	30
Training programme on "Water and fertilizer management in rice crop"	Nijogakasoti, Khorda	September 12, 2024	35
Training programme on "Crop and water management strategies for enhancing yield and income from *rabi* season crop"	Garedipanchan village, Puri	September 19, 2024	82
Training programme cum demonstration on "Cultivation of paddy straw mushroom"	Bhiligram, Khorda	September 24,2024	52
Training cum demonstration on "Paddy straw mushroom farming as a profitable enterprise for promoting self-reliance (*Atmanirbhar*) and nutritional security"	Haridamada, Jamujhari & Barapita	November 7, 2024	75
Training programme on "Crop intensification and diversification of rice-based production system for enhancing water productivity and farm income"	Makundpur, Cuttack	December 1, 2024	71
Training cum demonstration on "Crop intensification and diversification of rice based production system for enhancing water productivity and farm income"	Haridamada & Jamujhari, Barapita	December 3, 2024	60
Training programme on "Crop intensification and diversification of rice-based production system for enhancing water productivity and farm income"	Belera, Cuttack	December 17, 2024	89

Training programme on "Crop intensification and diversification of rice-based production system for enhancing water productivity and farm income"	Athantar, Puri	December 23, 2024	52
Training cum demonstration on "Ensuring nutritional security of rural families through women-friendly nutri-smart gardens"	Haridamada	December 24, 2024	50
Training programme on "Crop intensification and diversification of rice-based production system for enhancing water productivity and farm income"	Chanrpada, Puri	December 27, 2024	64

Webinar / Programs / Virtual Meetings Attended by Scientists

Official	Name of the conference/ meetings/ workshop/ symposium/ seminar	Organized by	Period
Dr. S.K. Rautaray All scientists	S&T Interventions project review Meeting	ICMR-RMRC, Bhubaneswar	July 5, 2024
Dr. S.K. Rautaray	International conference on "Sustainable agricultural development and climate smart system" (SADCSS)	SOA University, Bhubaneswar	July 18-20, 2024
Dr. S.K. Rautaray	International conference on "Building small holder climate resilience for achieving sustainable food Systems"	OUAT, Bhubaneswar	September 17-19, 2024
Dr. B.K. Sethy Dr. B.S. Satapathy Dr. R.R. Sethi Dr. Ashok K. Nayak Dr. D. Sethi Er. Ajit K. Nayak	3rd International Conference on "Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)" cum "Workshop on Technological Empowerment and Demonstration for SC Farm Women"	ICAR-CIWA, Bhubaneswar	November 6-8, 2024.
All scientists	Brainstorming Workshop on "Reclamation and management of waterlogged area for enhancing the livelihood of stakeholders of coastal Odisha"	ICAR-IIWM, Bhubaneswar	November 23, 2024
Dr. S.K. Mishra Dr. B.S. Satpathy	3rd *Indian Rice Congress* on "5 G enabled Rice based Agri-Food Systems for Nutrition and Livelihood" at during.	National Rice Research Institute, Cuttack	December 5-7, 2024
Dr. S.K. Rautaray	Conference on "Digital Agriculture: Empowering Indian Farming"	NAAS-ICAR-ICRISAT, NASC, New Delhi	December 17-18, 2024
Dr. S.K. Rautaray	Workshop on "Long-term CA/RA-based Experiments in India"	CIMMYT, NASC, New Delhi	December 19 2024

- Dr. P. Panigrahi was part of the expert team to visit Raipur during December 11-12, 2024 and Dr. S. Mohanty was part of the Expert Team to visit Gwalior during December 19-21, 2024 to study technical capability, experience and capacity of micro-irrigation factories.
- Dr. S.K. Mishra, Principal Scientist received the 'ICAR Certification' during the ICAR Foundation Day celebration on July 16, 2024 for his innovative 'INSPIRE Extension Model' for fast popularization of rice varieties and technologies.
- Dr. S.K. Mishra, Principal Scientist received the 'Fellow Award 2024' of the 'Association of Rice Research Workers' (ARRW) for his outstanding contributions in rice research during the '3rd National Rice Congress' held at ICAR-CRRI, Cuttack during December 5-7, 2024.
- Dr. S.K. Mishra, Principal Scientist has been elected as the Vice President of the Executive Council of the 'Association of Rice Research Workers' (ARRW), ICAR-CRRI, Cuttack for the triennial period of 2025-27.
- ICAR-IIWM, Bhubaneswar received the 2nd best '*Swachhta Pakhwada* Ranking Award 2022' among all ICAR Institutes from the Council for undertaking significant and innovative *swachhta* activities during the *Swachhta Pakhwada* (December 16-31, 2022).
- Twenty adopted farmers and farmwomen under the Famer FIRST Project and MGMG Programme were felicitated during the World Soil Day on December 5, 2024.
- Dr. D. Ghosh received Best oral presentation award at ICAR-CIWA, Bhubaneswar during 3rd International Conference on "Climate-smart nutri-sensitive integrated farming system for gender-equitable sustainable agriculture: Prospects and Challenges" during November 06-08, 2024.
- Er. Ajit K. Nayak, Scientist received best oral presentation in the International conference on "Sustainable agriculture development with climate smart systems" organized by center for climate smart agriculture and faculty of agricultural sciences at Siksha O Ansuandhan, Bhubaneswar during July 18-20. 2024.

DD Kisan/TV Programmes

- Dr. P. K. Panda, Principal Scientist of the Institute acted as resource person to discuss effective crops and cropping systems for preventing soil and water erosion in DD Odia channel on July 1, 2024.
- Dr. P. K. Panda, Principal Scientist of the Institute acted as an expert in the discussion on Scope of Organic Farming in Odisha in Naxatra TV on September 1, 2024.
- Dr S.K. Rautaray shared his field experiences on Rice-fish Integrated Farming System and Water Management on October 22, 2024

Radio Talk

- Dr. P. K. Panda, Principal Scientist of the Institute was invited to deliver a talk on "Death of living world if rivers die" in All India Radio Cuttack on November 15, 2024 under Sammunnata Bharat programme.

Joining, Promotion and Superannuation

- Ms. Subhashree Satapathy, promoted to AF&AO, ATARI, Zone-VII, Umiam, Shillong w.e.f. August 20, 2024
- Mr. P. C. Singh Tiyu, Technical Officer superannuated on September 30, 2024.
- Ms. Pooja Uppal joined as Assistant at ICAR-IIWM on September 27, 2024.
- Ms. Deblina Chakraborty joined as Assistant at ICAR-IIWM on October 28, 2024.
- Dr. M. Raychaudhuri, Principal Scientist took VRS from ICAR service w.e.f. December 18, 2024.

Glimpses of Major Events/Activities Conducted by ICAR-IIWM

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