

ICAR Research Complex for Eastern Region, Patna भारतीय कृषि अनुसंधान परिषद का पूर्वी अनुसंधान परिसर, पटना

ICAR RCER NEWS

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From Director's Desk

Strategic and adaptive research integrated for efficient management natural of resources to enhance the productivity of agricultural production systems in the **Eastern Region**

Transform low productivity-high potential eastern region into high productivity region for food, nutritional and livelihood security

Utilization of seasonally waterlogged and perennial water bodies for multiple uses of water

Promote network and consortia research in the Eastern Region



The Eastern region of India is blessed with abundant natural resources, including fertile lands and diverse water sources. Agriculture plays a pivotal role in the livelihoods of approximately 83% of the region's population. However, despite favourable agro-climatic conditions, the agricultural performance remains at a subsistence level. A significant number of farming families are trapped in miseries due to various challenges, including unpredictable monsoon, poor water management, inadequate availability of timely and quality inputs at affordable prices, and small and fragmented land holdings. Further, the impact of climate change and weather extremes like droughts and floods contribute to low productivity and farmer's income. To address these complex issues and alleviate poverty, there is an urgent need to make agriculture more resilient to diverse adversities and increase net returns from agriculture. Recent years have shown some progress, but the pace of transformation must be accelerated through policy reforms, institutional improvements, and the development of agri-infrastructure and markets. Diversifying agricultural practices towards high-value produce, such as dairy, horticulture, fisheries, etc holds immense potential for boosting farmers' incomes.

An integrated-farming-system approach is recognized as the most effective way to enhance profitability and resilience in agriculture. However, this transformation demands substantial investment in physical and financial infrastructure, including agro-processing units, rural warehouses, cold storages, and cold chains. Establishing efficient financing institutions is also essential to support farmers' endeavours. Additionally, there is a need to improve marketing facilities through public-private partnerships to ensure fair prices and reduced transaction costs. Further, the underinvestment in agricultural development, particularly in land, water, markets, and extension services, has hindered the region's progress. To unlock the full potential of Eastern India's agriculture, concerted efforts are required to address these areas of neglect.

A comprehensive approach that includes technological advancements, policy reforms, institutional strengthening, capacity building and strategic investments in agri-infrastructure is essential to pave the way for a sustainable green revolution in the region. By empowering farmers and promoting agricultural diversification, Eastern India can forge a prosperous and resilient future for its agricultural sector. ICAR RCER through its headquarters at Patna, Research Centre at Ranchi and its two KVKs (one each at Buxar and Ramgarh) would strive hard to contribute towards overall development of the region with focus on agriculture by strengthening collaboration and co-operation with Central and State Govt agencies, Universities, Institutes and private partners.





Climate resilient rice varieties released and notified

Three climate resilient rice varieties 'Swarna Purvi Dhan 1', 'Swarna Purvi Dhan 2' and 'Swarna Shusk Dhan' developed by ICAR RCER, Patna, have been released and notified by the Government of India [S.O. 1056 (E) dated 6th March 2023]. Salient features are given below:

Swarna Purvi Dhan 1: 'Swarna Purvi Dhan 1' is an early duration (115-120 days), high yielding (4.5-5.0 t/ha) and multiple stress (drought, disease and insect pest) tolerant variety with desirable cooking quality traits and high micronutrients (Zn: 20.4 ppm; Fe: 13.8 ppm) content. It is suitable for cultivation under directseeded aerobic condition in water limiting areas of Jharkhand. It shows moderate resistance to leaf blast, neck blast, sheath rot, brown spot, sheath blight, false smut and RTD diseases, and to major insect-pests, *viz.*, stem borer, leaf folder, gall midge (biotype 1), whorl maggot and plant hopper.



Swarna Purvi Dhan 1

Swarna Purvi Dhan 2: 'Swarna Purvi Dhan 2' is a semi-dwarf, high yielding (5.0-5.5 t/ha), early duration (115-120 days) and multiple stress (drought, disease and insect pest) tolerant, fertilizer responsive and lodging resistant variety with long slender grain type. It is suitable for cultivation under transplanted condition in irrigated ecology of Jharkhand. In addition, this variety is also suitable for direct seeded aerobic condition. It shows moderate resistance to leaf blast, BLB, sheath blight, leaf scald, glume discoloration and false smut, and to major insect pests like stem borer, leaf folder, rice thrips, gall midge (biotype 5) and caseworm.



Swarna Purvi Dhan 2

Swarna Shusk Dhan: 'Swarna Shusk Dhan' is a semidwarf, high yielding (4.0-4.5 t/ha), early duration (110-115 days), multiple stress (drought, disease and insect pest) tolerant, fertilizer responsive and lodging resistant variety with desirable cooking quality traits and long slender grain. It is suitable for cultivation under direct seeded condition in drought prone rainfed midland to upland ecosystem of Uttar Pradesh. It shows moderate resistance to leaf blast, neck blast, sheath rot and false smut, and to major insect pests such as stem borer and leaf folder under natural condition.



Swarna Shusk Dhan

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Varieties of tomato and chilli recommended for notification

During the 30th Meeting of *Central Sub-committee on Crop Standards, Notification and Release of varieties for Horticultural Crops,* one variety of tomato (Swarna Prakash) and two varieties of chilli (Swarna Apurva and Swarna Arohi) developed at ICAR RCER Farming System Research Centre for Hill and Plateau Region, Ranchi were recommended for notification and release for the state of Jharkhand. The salient features of these varieties are given below.

Swarna Prakash: 'Swarna Prakash' (RCDT-1314) has determinate growth habit and vigorous growth having bacterial wilt resistance and attractive fruits. It grows as high as 75-80 cm. Fruits are slightly flattened with attractive dark red colour at maturity. Its fruit yield is as high as 45-50t/ha. The TSS, acidity and ascorbic acid contents are in the range of 3.0-3.8°brix, 0.18-0.20% and 10-15mg/100g fruit, respectively.



Swarna Prakash

Swarna Apurva: 'Swarna Apurva' (HC-70) shows vigorous growth with a high level bacterial wilt resistance and pungency (total SHU 90194, capsaicinoids 0.56g/100g dry weight) at green chilli stage. It is high yielding (20-25t/ha) with green pendulous fruits having good level of vitamin A (246.94 mg/100g dry weight) and vitamin C (135.2mg/100g fresh weight).



Swarna Apurva

Swarna Arohi: 'Swarna Arohi' (HC-69) has also shown vigorous growth, bacterial wilt resistance and high degree of pungency (total SHU 50431, capsaicinoids 0.31g/100g dry weight) at green chilli stage. It is also high yielding (20-22 t/ha) with dark green upright fruits having good level of vitamin A (211.87 mg/100g dry weight) and vitamin C (112.5mg/100g fresh weight).



Swarna Arohi

NEW INITIATIVES

In a view to discuss and promote scientific culture in the Institute and ignite young minds in frontier areas of research as well as looking for innovative and novel ideas to address diverse agricultural challenges, a new initiative of "Weekly Seminar Series" on each Friday 4.30 to 5.30 pm is being introduced. The Scientists and staff of the Institute including Centre and KVKs discuss and deliberate freely on a challenging topic in each week end. The experts and resource persons from outside will also be invited in due course of time.

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Evaluation of climate resilient interventions in rice

Climate-resilient approaches such as direct seeded rice (DSR) and Greenseeker-based nutrient management are proven for efficient resource utilization and reducing carbon emission, labor, time and water requirement. An effort was made to compare the DSR and conventional practice in Buxar and Gaya districts of Bihar under CRA Programme. A total of 383 farmers' field trials conducted in ten villages (5 villages in each district) were considered for the assessment. Yield data were recorded for all the rice varieties (Arize 6444 Gold, Swarna Shreya, Swarna Samriddhi and Rajendra Sweta) and analyzed. It was observed that grain yield of all DSR plots were higher than that of plots using traditional practices in both the districts (Fig. 1).



Fig. 1. Performance of DSR and Greenseeker-based nutrient application in Buxar and Gaya districts under CRA Programme

Among the rice varieties, Arize-6444 Gold recorded the highest grain yield (6.42 & 6.61 t/ha at Gaya and Buxar, respectively) under DSR, 30.41% and 15.06% higher than the local check at Gaya and Buxar, respectively. During 2022, Kharif season was negatively affected by scarce rainfall due to delay in monsoon by a month. Therefore, in Buxar, CO-51 (a short duration rice variety) was demonstrated which gave comparatively good yield (5.42 t/ha); moreover, it also recorded higher yield than a medium duration rice variety 'Rajendra Sweta' (4.71 t/ha). The cost of cultivation under DSR was found to be lower than the local transplanting method that in turn increased the net profit under DSR. However, the net income differed greatly across rice varieties at both the locations. In both Gaya and Buxar, rice variety Arize-6444-Gold gave almost 40% higher net return than the local check. The net income for other demonstrated varieties under DSR were also higher than the local practice (transplanting). Greenseekerbased nutrient management was also found to have a positive impact

on yield in both districts as this intervention increased rice yield by 9.8% and 19.2% in Buxar and Gaya, respectively.

DK Singh, Abhay Kumar, U Kumar, Md Monobrullah, Rohan K Raman, R Singh, Ramkewal and Sudip Sarkar

Crop diversification with pearl millet under rainfed production system of Bihar

With the looming threat of climate change on crop productivity, pearl millet (Pennisetum glaucum), which has proven drought tolerance characteristics, may be used as an alternative potential crop to diversify ricebased cropping system in rainfed upland ecology of Bihar. Recently, high yielding varieties and hybrids have been developed by public and private sectors, which have extra short maturity duration (90-95 days), large seed and medium dwarf plant types; these are suitable for cultivation in longer prospective. Thus, a field study was conducted at the ICAR Research Complex for eastern Region, Patna and the farmer's field in Gaya (Bihar) under Climate Resilient Agriculture programme during Kharif 2022 to assess feasibility of growing pearl millet (cv. Proagro-9450) in rainfed upland conditions of Bihar. The results showed that the pearl millet variety 'Proagro-9450' recorded yield level of 2.5-3.0 t/ha, and matured in 90-95 days with limited agronomic input management practices. It is thus obvious that extra early varieties of pearl hold promise for diversification rainfed upland agroecosystem of Bihar.



Rakesh Kumar

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Quantifying global warming potential of different irrigation systems in Rabi crops

Irrigation systems play a crucial role in managing cool season crops during Rabi season. A field experiment was conducted during Rabi 2021-22 comprising three crops, viz., lentil (cv HUL 57), chickpea (cv Pusa 256) and Indian mustard (cv RH 749), under three irrigation systems (drip, sprinkler and surface irrigation) and control to evaluate their global warming potential. Greenhouse gas emission was sampled through close chamber technique and measured in gas chromatograph. On a 100-year time scale, global warming potential (kg CO2/ha) was the highest in surface irrigation (1177.0) followed by sprinkler (898.3) and drip (840.0) systems as compared to the control (685.7), whereas the highest yield was recorded with the drip irrigation system.



Fig. 2. View of experimental field during greenhouse sampling

Rachana Dubey

RCEWS1 – a promising genotype of water spinach for upland ecology of Bihar

Water spinach (*Ipomoea aquatica*), popularly known as kalmi saag, is typically grown in waterlogged areas. However, with the development of low-water requiring genotypes, its cultivation may be extended to rainfed upland ecology. At ICAR RCER, Patna, a high-yielding line 'RCEWS1' of water spinach has been identified. This line is a selection from indigenous collections. For its use as the vegetable, its leaves become ready for harvest prior to flowering. The crop typically gets ready for harvest at 50-60 days after sowing. Flowering begins when the days become short, and average temperatures gradually decrease typically from October onwards. Seedset starts during December, and fruits get ready for harvest when they turn yellow during middle of March (Fig 4).



Fig. 3. Field view of RCEWS1 Kumari Shubha and Abhishek Kumar

Management of false smut through modification in sowing date and establishing disease relation with weather parameters

A factorial RBD experiment comprising five rice genotypes (IR11F195, IR09L 342, Maudamani, Swarna Shreya and Swarna Samridhi Dhan) and five seeding dates (May 21, 2022; June 5, 2022; June 20, 2022; July 5, 2022; July 20, 2022) with three replications was carried at the main Farm of ICAR-RCER, Patna. False smut incidence varied among five genotypes with the maximum incidence in Maudamani (141 balls/5 hills) observed on the second seeding date (June 5, 2022). Low false smut severity was observed in the first and the last seeding dates; however, substantial mean yield reduction (46.77%) was abserved under the last seeding date. The present findings indicate that early seeding may help in reducing the loss from false smut disease in rice.



Fig. 4. False smut severity in 'Maudamini' (second seeding date)

AK Dubey, Santosh Kumar, G Makarana and Manisha Tamta



Arsenic-resistant PGPR isolated from Paddy Soil

Agriculturally cultivated area in the Ganga river basin is contaminated (> 20 ppm) with arsenic. This class-1 carcinogen enters into the food chain through food crops grown in the Ganga river basin. The consumption of arsenic through food has adverse health effects on the human population. Total 50 plant growth promoting rhizobacteria (PGPR) strains showing *in vitro* P and K solubilization, Zn solubilization, and Indole Acetic Acid production were isolated from arsenic-contaminated paddy fields of the river basin extending from Bihar to west Bengal. Arsenic resistant PGPR have the potential for plant growth promotion and arsenic reduction in paddy. Best-performing PGPR isolates could be evaluated for paddy growth promotion and arsenic amelioration under *in situ* experiment.





P solubilization by A15P8

P solubilization by B1



Evaluation of natural farming in eastern hill and plateau region

The experiment is ongoing to evaluate the natural farming module for four cropping systems, viz., paddy lentil, black gram - niger, finger millet - mustard and cowpea - chickpea, in the eastern hill and plateau region. The initial trend showed that cowpea, chickpea, finger millet and lentil under natural farming resulted in higher crop productivity than that in conventional farming, whereas black gram and mustard were yielding better in the conventional farming. The rice equivalent yield (REY) of chickpea (1.76 t/ha) and lentil (1.32 t/ha) was higher in natural farming; however, the mustard recorded higher REY (1.29 t/ha) in the conventional system. The initial trend showed that among four cropping systems, cowpea-chickpea gave the highest REY (14.04 t/ha) in natural farming compared to the conventional system (11.97 t/ha). However, the remaining three showed higher REY in conventional system. The cowpea and finger millet under natural farming resulted in higher gross income (Rs 1, 64,438 and Rs 66,000, respectively) in comparison to the conventional system (Rs 1,48,125 and Rs 59,200, respectively). The black gram and paddy showed higher income in conventional farming. The chickpea and lentil resulted in significantly higher gross income in natural farming, whereas niger was found at par in both the systems. The microbial count, available nitrogen and potassium and bijamrita treated seeds showed better trends in natural farming.



Fig. 6. Field view of Kharif crops

B K Jha

K solubilization by A15P8 Fig. 5. PGPR activity for P and K solubilization

Saurabh Kumar, CM Kumar, Kirti Saurabh, and R Dubey

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Breeding for bacterial wilt resistant rootstock in brinjal

Bacterial wilt causes heavy yield losses in tomato especially during rainy season. Grafting of resistant brinjal rootstocks on high-yielding susceptible cultivars gives immediate answer to this problem. Tube grafting is a very simple technique which can be easily practiced by the farmers in the same season. Mortality of the grafts is also less. An experiment was carried out to identify resistant rootstocks of brinjal and tomato, and to study the effect of grafting in susceptible tomato cultivar for plant survival and fruit yield. Among the 40 germplasm of brinjal, tomato and wild species of brinjal evaluated for bacterial wilt resistance, six germplasm (5 of brinjal, viz., Solanum torvum, HAB-901, HAB-921, HAB-928 and HAB-930, and HADT-296 of tomato) recorded more than 90% plant survival against bacterial wilt in wilt sick plots. 'Swarna Baibhav' (tomato) grafted with S. torvum recorded the highest yield (193 t/ha) followed by 'HAB-901' (182 t/ha). 'HAB-921', 'HAB-928' and 'HAB-930' yielded 164.8 t/ha, 151.6 t/ha and 132.1 t/ha, respectively. Ungrafted control yielded 47.8 t/ha with only 40% plant survival against bacterial wilt. 'Swarna Baibhav' grafted on 'HADT-296' yielded 84.3 t/ha. 'HAB-901', 'HAB-921', 'HAB-928' and 'HAB-930' of brinjal were found to be compatible with tomato, showing superior performance and suitable for commercial grafting.



Fig. 7. Field view of *Kharif* crops

P Bhavana, AK Singh, AK Jha, JS Choudhary and N Anjum

Rust resistant genotypes of French bean identified for eastern hill and plateau region

A total of 72 accessions of French bean (*Phaseolus vulgaris*) were evaluated for rust reaction at FSRCHPR, Plandu, Ranchi (Jharkhand). Four genotypes, namely 'RCFB 6', 'RCFB 14', 'RCFB 15' and 'RCFB 37', were identified as highly resistant to rust (scored 0 on a scale of 0-5) in spring/summer season. These genotypes have bushy plant type with distinct pod shape (round and flat) and colour (light green to dark green). 'RCFB 6' recorded the highest green pod yield (5.5 t/ha) in 90 days, whereas the green pod yield of the remaining three genotypes was in the range of 4.0-5.2 t/ha. All the four genotypes also showed highly resistant reaction to rust when inoculated artificially under controlled condition.



Fig. 8a. Rust resistant round podded 'RCFB 6'



Fig. 8b. Rust resistant flat podded 'RCFB 14'

Meenu Kumari







Swarna mango masala roll developed

'Swarna mango masala roll' is a product with unique natural colour and flavour having no preservatives. This product has been prepared with a blend of various mango pulps, spices and condiments. Its moisture and sugar content are around 20-22% and 20%, respectively. The product has a good shelf life (2-3 months at 20-25°C). It may be tray dried or sun dried depending on the facilities available with the entrepreneur. The product can be made from a specific mango variety or a blend of mango pulps from different varieties. It may be packed in cellophane, and hence, no special and costly packaging material or technology is required for packaging. The product bears all the goodness of mangoes.



Fig 7. Swarna mango masala roll

Prerna Nath

Fish otolith structure and its importance in fisheries

Otolith, which is predominantly composed of calcium carbonate (CaCO3), acts as a balance organ and a hearing assist to all teleost fish. It can be used to study fish ecology, age, growth, ontogeny, palaeontology (to identify fossil fish), stratigraphy, archaeology, zoogeography, stock identification, and feeding behaviour. The current study examined the morphometric connections between fish and otoliths of the economically and nutritionally significant pool barb (Puntius sophore) collected from the Ganga and Punpun rivers flowing across regions of Bihar. Fish LWRs, length frequency distributions, condition variables and otolith aspect ratios correlated positively with one another. The ecosystem of both the rivers was found suitable for this species. These links are significant for fisheries management, and may be employed in future studies of food, stock structure, time series environmental alterations, and conservation initiatives.



Jaspreet Singh, SK Ahirwal, Tarkeshwar Kumar, V Bharti and Kamal Sarma

Azolla production technique standardized

Azolla (*Azolla pinnata*) production was carried out with 500 L water in FRP tank (150 cm diameter and depth 36 cm) with four different concentrations of phosphate level. For nutrient supply to Azolla, a mixture of 8 kg soil and 1.5 kg of cow dung was kept in the bottom of the tank filled with water. The next day, 20, 30, 35, 40 grams of NaH₂PO4 were mixed in Tank 1, Tank 2, Tank 3 and Tank 4, respectively, and left for one day for releasing the phosphate nutrient in the water. On the third day, 100 g of wet Azolla was stocked in each tank, and the temperature and pH of each tank were monitored daily in the morning hour. Just after two weeks, Azolla was harvested. Highest Azolla production was recorded in the Tank 4 (Table 2).



Fig. 9. Steps followed for Azolla production Vivekanand Bharti, Kamal Sarma, T Kumar, SK Ahirwal and Jaspreet Singh

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Table 1. Water quality and growth parameters used for Azolla culture					
Parameters	Treatments				
	Tank 1	Tank 2	Tank 3	Tank 4	
Temperature (°C)	29.5 (27.0-31.3)	28.8 (26.7-31.0)	28.2 (26.0-30.6)	28.0 (25.9-30.7)	
рН	7.14 (6.20-7.90)	7.38 (6.73-8.17)	7.45 (7.00-8.56)	7.37 (6.32-8.47)	
Azolla harvest (kg)	2.17	1.85	1.89	2.42	
Azolla growth rate (kg/day)	0.17	0.15	0.15	0.19	

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Agro-chemical spraying drone demonstrated at farmers' fields

Drones have opened up new possibilities in agriculture to increase crop yield with efficient farming applications and real time access to information. Its use in agriculture is expected to rise for achieving new targets of crop yields and reducing production cost. Two sets of agri-drones have been procured at the ICAR-Research Complex for Eastern Region, Patna to demonstrate spraying of agro-chemicals at farmers' fields of the eastern region. The drone was operated and evaluated at the farms on May 11, 2023. Before operation, drones were inspected for any possible errors/malfunctioning while flying. The spraying system was also tested for any leakage after filling water in the tank. During the spraying operation, the nozzle covered a width of 3.8 m. Spraying of nano urea using agri-drone was demonstrated on 10 acre area of wheat crop at Abhranchak village under Naubatpur Block in the Patna district of Bihar. Till date, this technology has benefitted a total of 9 farmers belonging to Naubatpur The institute aims at extending such block. demonstrations also in the state of Jharkhand.



Fig. 10. Demonstration of spraying of *nano* urea using agri-drone at Abhranchak village under Naubatpur block of Patna district (Bihar)

PRAYAS: an integrated approach for livelihood improvement of weaker section

The institute has undertaken a programme named PRAYAS: Participatory Research Application for Year Round Income and Agricultural Sustainability under Schedule Caste Sub Plan for imparting training and demonstrations on improved technologies in selected villages, namely Kamrup (Assam), Patna (Bihar), Jashpur (Chhattisgarh), Ramgarh (Eastern Uttar Pradesh), Ramgarh (Jharkhand), Sundargarh (Odisha) and Malda (West Bengal), of the eastern region. The objective is to enhance livelihood of weaker section through location specific technological interventions in an integrated approach. The following inputs were distributed in the respective villages.

Items/Activities	No/Qty	No. of		
		beneficia ries		
Trainings (capacity building/	03	90		
skill development of 1-3 days)				
Awareness camps, exposure	08	521		
visits, etc				
Ouality souds of vogetable grops	$\frac{1000}{232.60 \text{ kg}}$	80		
Quality seeds of vegetable crops	232.00 Kg	00		
Saplings of nursery plants	6000	100		
a. Mushroom spawns	200 kg	40		
b. bio-fertilizers	200 Kg	220		
Small equipment (up to Ks.		320		
1 Spade and Pick ave	260			
2 SS Mille Cap (5 I)	200			
$\frac{2}{3} SS Bucket (10 I)$	200			
A Tarpaulin	200			
5 Irrigation nump with	14			
delivery and irrigation pipe	00			
6 Seed Storage Drum	05			
Medium equipment/machinery	05	294		
a Knapsack Spraver	254	271		
b Dry land weeder	40			
Large equipment/machinery	Mini-rice	34		
Large equipment, machinery	mill	(through		
	11111	8 SHGs)		
Setting up plant nursery/seed		42		
farm/hatchery		12		
a Portray	200			
b Fencing net (100 m^2)	200			
FYM/Vermicompost	200 kg	40		
Plant protection biological	80 Kg	40		
(Trichoderma)	0			
Animal feed (Mineral mixture;	175 kg	65		
Agrimin forte)	0			
Animal medicines		192		
a. PPR Vaccine	628 goats			
b. TRIOVAC vaccine	101 cattle			
(FMD+HS+BQ)				
c. Cephalexin (CEF-XLR)	100 pouch			
powder-20 g pouch				
d. Dewormer (Fentas plus)	400 strips			
e. Medicines for animal	_			
treatment	115 animals			
Services/Facilitation				
Animal health camps	66			
Distribution of literature on C	150			
Oyster Mushroom, Organic c				
vegetables, Scientific cultivation				
Scientific cultivation of toma				
cultivation, French bean cultiv				
gourd cultivation and Papaya cul				

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DST-SERB Sponsored a High-End Workshop (Karyashala)

A High-End Workshop (Karyashala), sponsored by Accelerate Vigyan under DST-SERB on "Advanced Instrumentation for Assessment of Greenhouse Gas Emission and Molecular Techniques in Microbial Diversity Analysis", was organized during June 21-27, 2023 at ICAR Research Complex for Eastern Region, Patna. The event was attended by a total of 25 MSc and Ph D students belonging to various disciplines from various Indian universities. Participants were exposed to hands-on exercises on advanced instrumentation for measuring greenhouse gas emissions, carbon fractionation, agarose electrophoresis, PCR and RT-PCR, which gel strengthened their skills and knowledge in using sophisticated equipments for their future research work. Dr Ashok Ghosh (Professor and HoD Research, Mahavir Cancer Institute and Research Centre, Patna) and Dr Anup Das (Director, ICAR-RCER, Patna) graced the valedictory function held on June 27, 2023. The programme was coordinated by Dr Rachana Dubey (organizing secretary), Dr AK Choudhary and Dr Saurabh Kumar (course coordinators).



A National Workshop Organized

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A national workshop on "Agricultural Water Management in Changing Climate" was organized on March 27, 2023 at ICAR RCER Patna. This was attended by renowned NRM scientists, viz., Dr AK Sikka (Country Representative-India, IWMI), Dr A Sarangi (Director, IIWM, Bhubaneswar), Dr KG Mandal (Director, MGIFRI, Motihari), Dr. Man Singh, The representatives of IIT, Patna, Department of agriculture also attended and deliberated on the topic. Dr Anup Das (Director, ICAR-RCER, Patna & Chairman, Organizing Committee) and welcomed the chief guest (Dr AK Sikka) and other dignitaries. He emphasized on increasing the water productivity in agriculture by promoting the use of alternate source of water and employing scientific water management approaches and enhancing the capacity of farmers to cope with climate

variability and change. In his presidential address, Dr SK Chaudhari (DDG, NRM) highlighted the importance of agricultural water management, and called for the adoption of precision agriculture, artificial intelligence, sensor-based monitoring, irrigation and canal automation. In his keynote address, Dr AK Sikka emphasized on innovative water management solutions for sustainable agriculture. Dr AK Upadhayaya (Head, DLWM) highlighted the importance of flood and drought management, irrigation and drainage management and on-farm water management under changing climate scenario. Four progressive farmers of Bihar also participated in the workshop. The workshop was organized successfully by Dr Akram Ahmed (Organizing Secretary), a scientist under DLWM, ICAR-RCER, Patna.



TRAININGS & OTHER EVENTS

- A farmer's training programme on "Management Strategies for Improving Agricultural Production" was organized during January 23-25, 2023 at ICAR-RCER, Patna.
- A training on "Managerial skills for extension professional" was organized during March 22-24, 2023 at ICAR-RCER, Patna.
- "World Water Day" was organized on March 22, 2023 at ICAR-RCER, Patna and its Research centres & KVKs.
- "World Intellectual Property Day" was organized at Farming Systems Research Centre for Hill and Plateau Region, Ranchi on the theme 'Women and IP: Accelerating Innovation and Creativity' in hybrid mode on April 26, 2023.





Celebrated 23rd Foundation Day of the institute

The celebration of 23rd Foundation Day of the ICAR-Research Complex for Eastern Region (ICAR-RCER), Patna started with the lighting of the lamp and ICAR song on 22.02.2023. Dr Anup Das, Director of the Complex welcomed the Chief Guest and other dignitaries. On this occasion, he briefed about the achievements made by the Institute in the last one year. He told that efforts made by our institute have led to steady increase in the use of conservation agriculture in paddy-wheat-green gram crop cycle. At present, the Institute is involved in the applied and adaptive research on Natural and Organic Farming, Integrated Farming System and climate resilient nutritious cereals. The development of climate resilient crop varieties has been going on, and the recently released five varieties of rice and two varieties of Faba bean bear testimony to this fact. The regional centres of ICAR-RCER have also made tangible contributions to the overall achievements of the Institute. In this context, makhana variety "Swarna Vaidehi" as well as thornless variety of water chestnut developed by Research Centre for Makhana is highly commendable. Our Farming System Research Centre for Hill and Plateau Region has also developed many new varieties of vegetables, which are not only high-yielding, but also have good quality attributes. To offset the deficiency of minerals in animals, ICAR-RCER has developed a mineral mixture "Swarnamin", the use of which is helpful in managing the problems of infertility and other diseases in animals. Registration of "Maithili" duck species and "Purnia cow" by the Breed Registration Committee of ICAR is one of the major achievements of the institute.

Dr N Sarvan Kumar, Secretary (Agriculture, Government of Bihar) and chief guest of the function, appreciated the research work done by the scientists of this institute, and advised them to do research to meet future challenges. He also highlighted the relevance of water in agriculture in the backdrop of changing climate. On this occasion, Dr Rameshwar Singh, Hon'ble Vice-Chancellor of *Bihar Animal Sciences* University praised the work done by the institute for the development of eastern region per se. Dr BS Mahapatra, Hon'ble Vice-Chancellor of Bidhan Chandra Agricultural University, stressed the need for farmer-friendly research in the field of agriculture and livestock. In the morning session, Dr Vilas A Tonapi (ex-Director, IIMR, Hyderabad) delivered an insightful lecture on the importance and diverse uses of millets. He narrated the rationale behind United Nations' decision to celebrate the year 2023 as the International Year of Millets. On this occasion, a "scientists-farmers interaction" meeting was organized in which the progressive farmers from Bihar, Jharkhand, West Bengal, Chhattisgarh, Eastern Uttar

Pradesh, Assam and Odisha participated. In the interaction meeting, some progressive farmers were honored for their outstanding contribution. The employees of different sections of the institute and media personnel associated with agriculture sector were also honored. The programme concluded with the vote of thanks by Dr. Ujjwal Kumar (Organizing Secretary, Institute's Foundation Day).



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Mango Festival *cum* Farmers' Fair Organized at FSRCHPR, Plandu, Ranchi

The "Mango Festival cum Farmers' Fair" was organized at ICAR RCER Farming System Research Centre for Hill and Plateau Region (FSRCHPR), Ranchi on June 7, 2023 to popularize improved mango technologies among various stakeholders of the Eastern Plateau and Hill Region. This event gave a platform to the custodian farmers for showcasing their unique mango varieties. Shri CP Radhakrishnan, Hon'ble Governor of Jharkhand and chief guest of the function) inaugurated the grand event in which more than 160 mango varieties and various other mango technologies were exhibited. Hon'ble Governor, in his inaugural address, appreciated the efforts and contributions of the Centre and urged that new technologies should reach to the farmers' fields. At this occasion, he felicitated various progressive mango farmers. Dr SK Chaudhari, DDG (NRM) emphasized the importance of biodiversity, and stressed on the adoption of new technologies for production. Shri Aboobacker increasing mango Secretary, Department Siddique (Principal of Agriculture, Animal Husbandry & Co-operative of the state) discussed about various agricultural schemes of the state government for the farmers. In the technical session, farmers interacted with experts for solving their problems. The technical sessions were chaired by Dr Bikash Das (Director, NRC Litchi), Dr Vishal Nath (OSD, ICAR-IARI, Jharkhand) and Dr S Kumar (Ex-Head, FSRCHPR, Ranchi).

At the outset, Dr Anup Das (Director, ICAR-RCER, Patna) extended a warm welcome to the esteemed guests, and elaborated comprehensibly about the recent progress in research and extension activities undertaken by the Institute. Over 700 participants comprising farmers belonging to the state of Jharkhand, Odisha, West Bengal and Chhattisgarh, students from colleges, stakeholders, representatives of state departments, scientists and staffs of the ICAR Institutes and KVKs participated in the event.







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DIGNINARIES VISITED

Shri Rajendra Vishwanath Arlekar, *His Excellency Governor of Bihar*, made a brief visit to the ICAR-RCER, Research Centre for Makhana, Darbhanga on March 26, 2023. Hon'ble Governor visited Makhana Research Farm, discussed various issues related to makhana growers, and appreciated the research work being carried out at the centre.

Shri Narendra Singh Tomar, Hon'ble Minister for Agriculture and Farmers' Welfare of India and President, ICAR Society, visited Research Centre for Makhana, Darbhanga on February 28, 2023. Hon'ble Minister appreciated the work done by the scientists of the Centre, and assured to upgrade the status of the Centre as the National Research for Makhana.

Shri Kailash Choudhary, Hon'ble Minister of State for Agriculture and Farmers' Welfare of India, visited ICAR-RCER, Patna on February 18, 2023. Hon'ble Minister visited the experimental site of Natural Farming along with the Director and scientists of the Complex. He appreciated the research work being performed to make "Natural Farming" a ground reality.

Dr Himanshu Pathak, *Secretary* (*DARE*) & *Director General* (*ICAR*), visited ICAR-RCER, Patna on February 27, 2023. On this occasion, Hon'ble DG, ICAR addressed the scientists, technical and administrative staffs of the Complex, appreciated the effort made by the institute, and congratulated scientists and other staffs for the achievements. He also highlighted the various initiatives undertaken by the council to revitalize ICAR, and interacted with the scientists and staff of the Institute.

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Scientist

Dr Anup Das, Director w.e.f 06.02.2023

Dr Abhishek Kumar, Scientist (Agroforestry) w.e.f 20.03.2023

Sh Rahul Kumar Raut, Scientist w.e.f 19.04.2023

Administrative

Sh Vipul Raj, Administrative Officer w.e.f 21.02.2023

Promotion 💕

Scientist

Dr Rohan Kumar Raman, Scientist (Level-10) promoted to Scientist (Level-11) w.e.f. 17.01.2023

Dr (Smt) Rajni Kumari, Scientist (Level-11) promoted to Sr. Scientist (Level-12) w.e.f. 23.01.2023

Dr Reena Kumari Kamal, Scientist (Level-11) promoted to Sr. Scientist (Level-12) w.e.f. 17.05.2023

Dr Manibhushan, Sr. Scientist promoted to Pr. Scientist w.e.f. 31.05.2023

Dr Pankaj Kumar, Sr. Scientist promoted to Pr. Scientist w.e.f. 18.05.2023

Technical

Sh Surendra Kumar Yadav, Technician promoted to Sr. Technician w.e.f. 20.01.2023

Sh Manoj Kumar Singh, Technician promoted to Sr. Technician w.e.f. 20.01.2023

Sh Sagu Kachhap, promoted to Technician (T-1) w.e.f. 20.01.2023

Sh Sanjay Lal Srivastava, Sr. Technician promoted to Technical Assistant w.e.f. 23.01.2023

Sh Aniruddha Sinha Mahapatra, TO promoted to STO w.e.f. 20.02.2023

Sh Gyan Prakash Singh, ACTO promoted to CTO w.e.f. 16.05.2023

Sh Pradeep Kumar Singh, TO promoted to STO w.e.f. 18.05.2023

Dr Dushyant Kumar Raghav, STO (SMS) promoted to ACTO (SMS) w.e.f. 18.05.2023

Md Afroz Sultan, TO promoted to STO w.e.f. 29.03.2023

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Sh Deva Narayan, TO promoted to STO w.e.f. 29.03.2023

Sh Pramod Kumar Singh, STO promoted to ACTO w.e.f. 29.03.2023

Sh Dharamjit Kherwar, STO (SMS) promoted to ACTO (SMS) w.e.f. 29.03.2023

Dr Indrajeet, STO (SMS) promoted to ACTO (SMS) w.e.f. 29.03.2023

Sh Ganga Ram, TO promoted to STO w.e.f. 29.03.2023

Sh Chandrakant, TO promoted to STO w.e.f. 29.03.2023

Smt Anima Prabha, TO promoted to STO w.e.f. 15.02.2023

Administrative

Sh Rashmi Kant, UDC promoted to Assistant w.e.f 01.02.2023

Sh Anil Kumar, UDC promoted to Assistant w.e.f 01.02.2023

Sh Lakshmi Prasad, UDC promoted to Assistant w.e.f 01.02.2023

Sh Markanday Mishra, UDC promoted to Assistant w.e.f 01.02.2023

Sh Nagendra Kumar, Assistant granted MACP w.e.f. 20.02.2023



Dr A Rahman, Pr. Scientist transferred to ICAR-CSSRI RS Lucknow w.e.f 22.03.2023

Dr Surajit Mondal, Scientist transferred to ICAR-CCRI, Nagpur w.e.f 24.03.2023



Dr AK Choudhary, Dr SK Naik, Dr Pankaj Kumar, Dr Saurabh Kumar and Mr Sarfaraj Ahmad



ICAR Research Complex for Eastern Region (An ISO:9001-2015 Certified Organization)

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Dr Anup Das takes over as the Director, ICAR-RCER, Patna

Dr Anup Das takes over as Director, ICAR Research Complex for Eastern Region, Patna (Bihar) on February 06, 2023. Prior to joining as the Director, he served at ICAR Research Complex for North Eastern Hill Region, Barapani (Meghalaya) in various capacities. His extensive research led to characterization of rice and maize fallow system and development of efficient Resource Conservation Technologies for sustainable crop intensification with pea, lentil, French bean, rapeseed, black gram and green gram in fragile and marginal hill ecosystem. He has systematically studied soil C-sequestration potential, water productivity, nutrient & energy use efficiencies and global warming/GHGs emission mitigation potential in these pulses/oilseed based rice/maize fallow systems. Double mulching in maize-based system, double no-till and residue retention, rehabilitation of degraded lands through perennial forage crops, no-till-cum-live mulching in rice-rapeseed system, raised and sunken bed land configuration and long term impacts of organic farming on soil moisture conservation, enhancing crop water productivity, improving soil properties, rehabilitation of degraded lands, soil Csequestration, and energy use efficiencies are his pioneering works to the field of natural resource management for achieving SDGs.

Dr Das has standardized Integrated Organic Farming system (IOFS) model in cluster approach for the first time in the country which was included in the COP27 country case studies from India. He has also been associated with the release of one soybean variety (Umiam Sb-1) and 3 maize varieties (Megha maize 1, Megha maize 2 and Mizo mimpui).



He established many model villages like seed village, organic village clusters, pilot village for sustainable Himalayan agriculture, NICRA/NPCC- TDC villages, high intensive vegetable based systems, IFS clusters and custom hiring centres. He has guided/ co-guided 17 masters and two Ph D students, and taught 6 courses to PG students. He has published 225 research articles, 74 books, compendium and technical bulletins, 75 book chapters, 35 popular articles/extension leaflets with a total citation of 5270, and h-index of 40.

Dr Das has served as the Vice President, Secretary and Joint Secretary of Indian Association of Hill Farming (IAHF), and Co-Chief Editor (Indian Journal of Hill Farming), Editor and Councilor (Indian Journal of Agronomy and Indian Journal of Soil conservation) and President of the Society for Advancement of Agricultural Innovations. Besides, he has also organized various national and international conferences as the Organizing Secretary. Dr Das has received several national awards, viz, ICAR-Lal Bahadur Shastri outstanding young scientist award, Swami Sahajanand Saraswati outstanding extension scientist award, Fakhruddin Ali Ahmed award, Interdisciplinary team research award and Dr HK Jain-CAU, Imphal Award. Besides, he has been the recipients of prestigious Fellowships of various academies and professional societies such as National Academy of Agricultural Sciences (2019), Indian Society of Agronomy (2017), National Academy of Biological Sciences (2021), Indian Association of Hill Farming-IAHF (2017) and Society for Biotic and Environmental Research (2020). The ICAR-RCER family welcomes him as the Director of this Complex.

