



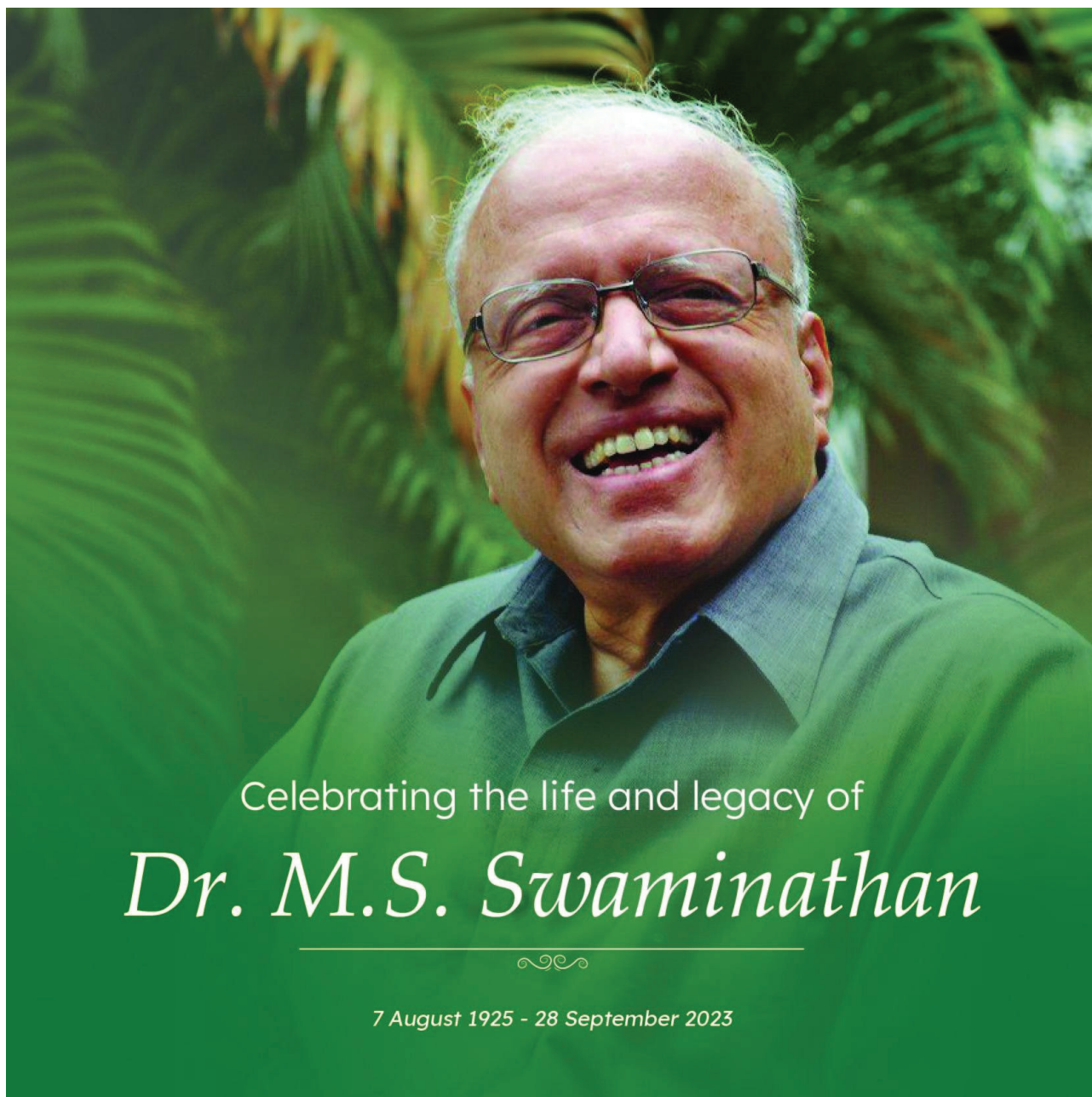
ISARC Cultivate

IRRI's hub for South-South Cooperation on Rice Research



ISARC
IRRI South Asia Regional Centre

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Celebrating the life and legacy of

Dr. M.S. Swaminathan



7 August 1925 - 28 September 2023

Congratulations !

IRRI scientist honored with Borlaug Field Award for her work on farmer engagement and empowerment



Together with women farmers in Odisha, India, Dr. Swati Nayak visited a field site to validate germplasms recommended by the national agricultural research and extension systems.

LOS BAÑOS, Laguna, Philippines (September 19, 2023)

International Rice Research Institute (IRRI) scientist Dr. Swati Nayak – a highly accomplished researcher known for her pivotal role in engaging farmers in demand-driven rice seed systems, from testing and deployment to access and adoption of climate-resilient and nutritious rice varieties – has been honored as the recipient of the 2023 Borlaug Field Award by the esteemed selection jury of the World Food Prize.

Endowed by the Rockefeller Foundation, the Borlaug Field Award, named in honor of the renowned agricultural scientist and Nobel laureate Dr. Norman Borlaug, is presented annually to individuals under the age of 40 whose pioneering and exceptional science based work have significantly advanced the world's food production and helped alleviate hunger and malnutrition. The recipient is awarded USD10,000 and an award diploma.

Dr. Nayak's illustrious career, spanning over 13 years, has been characterized by outstanding contributions, unwavering perseverance, and a profound commitment to bridging the gap between scientific knowledge and practical applications.

Apart from being the South Asia Lead for Seed Systems at IRRI, Dr. Nayak also has been serving as the lead for cereal seed system group under the key initiative SeedEqual of CGIAR.

Throughout her career, Dr. Nayak has organized more than 10,000 on-farm and comparative testings and participatory evaluations for more than 500 rice varieties and disseminated more than 20 critical path-breaking varieties that are climate-resilient, high-yielding, bio-fortified, and healthier through seed systems and scaling channels in many countries. One of her critical accomplishments include her role in positioning and creating early entry points for many potential drought-tolerant varieties in India. Nayak and her team formulated a strategy for introducing the drought-tolerant rice variety Sahbhagi dhan in Mayurbhanj, one of the most populous, mostly tribal, districts in Odisha, India. Eight years after Nayak's initial intervention, Sahbhagi dhan remains one of the most in-demand products in Odisha and the rest of India.

She is also one of the key scientists working in the international seed policy agreement that speeds up the distribution of modern rice varieties across South and

Southeast Asia called Seeds Without Borders. The Bangladesh Ministry of Agriculture Secretary Wahida Akter said in her nomination letter for Dr. Nayak, “Her role in releasing and expanding a number of promising novel rice varieties, developed in Bangladesh and introduced to India is highly regarded as this has effectively crossed geographic boundaries – research innovations reaching the hands of farmers, regardless of their nationality at a faster scale.”

Dr. Nayak has always advocated for gender inclusion in agriculture research, actively engaging women in participatory research. Her initiatives have led to the establishment of numerous women-led seed enterprises, benefiting not only in productivity but also income, decision-making authority, and overall empowerment of women.

Indian Ministry of Agriculture and Farmers Welfare Joint Secretary (Seeds), Shri Pankaj Yadav supported Nayak’s nomination and said, “Dr. Nayak has been championing various rural innovation models focusing on agriculture technology transfer, extension and enterprise development. Her stewardship in scaling various participatory field research and extension models are highly appreciated in the national system and replicated widely.”

From 2021 to 2022, through Dr. Nayak and her seed system team’s efforts, women-led seed enterprises were able to produce, distribute, and sell approximately 8.5 metric tons of quality seeds. More than 40 percent of the participants in her programs, whether on-farm testing of varieties, varietal demonstrations, participatory rice variety evaluation, or seed production, have been women farmers.

In addition to that, Dr. Nayak helped empower women in agriculture through her work with the National Rural Livelihood Mission (NRLM) spearheaded by the Indian Government and the World Bank. At NRLM, Dr. Nayak anchored a critical initiative known as Mahila Kisan Sashaktikaran Pariyojna (MKSP). This was the first ever such dedicated initiative approved by Indian Cabinet for women farmers. The MKSP initiative has benefitted four million women farmers to date.

The Borlaug Field Prize selection jury was impressed by Dr. Nayak’s tireless commitment to addressing the pressing challenges facing our planet and her accomplishments that have resonated far beyond the laboratory and in the field.



She expressed deep gratitude for receiving this prestigious award, stating, “I am deeply grateful to the World Food Prize Foundation for this honor which echoes our joint pledge to build a resilient food system and a better world for all. As a proud IRRI-CGIAR Scientist and having the opportunity to work with several eminent researchers, I dedicate this award to thousands of agriculture extensionists, change agents, and scaling and innovation experts specifically to all the young women professionals who are directly working with the farmers.”

“This moment is a new beginning and a great opportunity to further strengthen my efforts, voice, and impact as a field scientist. I look forward to working relentlessly, and ensuring that novel technologies, knowledge, and resources reach the farmers faster while ensuring equity and inclusivity,” she added.

IRRI Interim Director General Dr. Ajay Kohli attested to Nayak’s exemplary work. He said, “Dr. Nayak has made a significant and quantifiable impact on sustainable rural livelihoods, agricultural extension, and food security. Through her dedicated efforts, numerous farming communities have experienced increased crop productivity, improved income generation, and enhanced seed availability.”

The award was officially announced on 19 September 2023 during a CGIAR-hosted event at the New York City Climate Week. Dr. Nayak has formally received the award during the Borlaug Dialogue on 24 October 2023 in Des Moines, Iowa.

Congratulations !

ISARC director honored with Crop and Weed Science Society (CWSS) gold medal awards



ISARC director Dr. Sudhanshu Singh delivering his invited lecture in the conference

West bengal, India (September 30 - October 02, 2023)

The Crop and Weed Science Society (CWSS) has conferred CWSS Gold Medals to ISARC Director Dr. Sudhanshu Singh and IRRI Deputy Head-Sustainable Impact Department Dr. Virender Kumar in the sixth international conference on “agricultural innovations for sustainable development goals with special focus on natural farming” for their outstanding contributions in the field of crop and weed Science.

Dr. Singh and Dr. Kumar were invited as Guests of Honor at the conference. In the plenary session, Dr. Singh delivered his talk on “Transforming sustainable rice-based agri-food systems: recent innovations and interventions”, wherein he urged for a paradigm shift with concerted research and extension efforts, collaborations, networks, and partnerships for transforming agriculture and food systems in a world challenged by climate change.

Delivering his plenary note on the conference's second day, Dr. Kumar put forward his points on “sustainable rice production for improving food and nutrition security, environmental sustainability, and smallholders’ income”. He highlighted new innovations, best possible interventions, and effective strategies for bringing resilience and sustainability in the agri-food systems with a view to secure healthy, safe, and nutritious food for all. Both the sessions were highly appreciated by the audiences with a couple of questions and answers related to recent developments in rice science.

The conference was organized by the CWSS at Farmers’ Academy and Convention Centre, Lake Hall, Kalyani, West Bengal, India during September 30 - October 02, 2023, where more than 500 delegates including research and extension professionals, scientists, students, farmers, and other stakeholders from Bangladesh, India, Philippines, USA, and Sri Lanka.

IRRI and Odisha Government collaborate on strengthening the state's drought mitigation plan



IRRI scientists and Odisha Government officials at the MoU signing for drought mitigation plan

Bhubaneswar, India (August 31, 2023)

IRRI and the Department of Agriculture and Farmers' Empowerment (DA & FE), Government of Odisha signed a bilateral Memorandum of Agreement (MoA) on 29 August 2023 in Bhubaneswar to understand the dynamics of drought in Odisha and its impact and identify the mitigation options for smallholder farmers through a new pilot project.

The agreement was signed between Shri Prem Charan Chaudhary, director, Agriculture and Food Production, Odisha on behalf of the DA & FE and Dr. Swati Nayak, scientist and South Asia lead – Seed Systems and Principal Investigator of this initiative, on behalf of IRRI director general.

IRRI has been associated with the Government of Odisha through multiple path breaking initiatives in the past decade and continues to do so. "Supporting the government's vision to promote, scale climate resilient varieties and a resilient agricultural system in the state has been one of our key approaches. Participatory planning, brainstorming with leading policy makers, agriculture functionaries, think tanks and researchers in state has been IRRI's way of work all these years. The successful engagements with the state are envisaged to reach a new milestone with this new project focused on small and marginal farmers in drought prone and drought affected districts in Odisha," said Dr. Nayak.

This project will engage IRRI, DA&FE and Odisha State Disaster Management Agency in a triangular partnership to support the overall drought mitigation strategy in the state. Through this project, a comprehensive research and pilot experiments will be conducted to introduce, evaluate and scale drought - tolerant germplasm/varieties in the state through robust community-led models and public-private partnership in seed chain. In addition, comprehensive targeting and evaluation will be done with piloted drought-resilient village clusters by integrating varietal interventions and other climate smart technologies.

After signing the MoA, Shri Prem Charan Chaudhary while congratulating the team, stated that the new project begins a new era focusing exclusively on the state's priority for drought mitigation and IRRI will be first among several partners to initiate this effort on ground.

Bolangir, Kalahandi, and Mayurbhanj are among the drought-prone districts in Odisha as identified by the Odisha State Disaster Management Authority (OSDMA). The project will be piloted in these three districts.

If successful, the model(s) employed for drought mitigation in the three districts can be a template for the deployment of the model across Odisha as well as in other states that share similar sociological and agro-ecological environments.

ISARC represents rice research and innovation at national and state-level exhibitions and farmers' fair

September 12-15, 2023

IRRI scientists attended the Global Symposium on Farmers' Rights organized from September 12-15, 2023 at NASC Complex, Delhi. The event was inaugurated by the Hon. President of India Draupadi Murmu and was organized by Food and Agriculture Organization of the United Nations (FAO), Rome and hosted by Ministry of Agriculture & Farmers' Welfare, Government of India.



ISARC scientists explaining interventions in conserving indigenous plant genetic resources

IRRI scientists showcased interventions and activities of the organization to conserve indigenous plant genetic resources. The event also featured an exhibition on "Plant Genetic Resources in India" where between 10-15 rice landraces along with value-added products made by traditional rice varieties were displayed.

September 21-25, 2023

ISARC scientists showcased innovative technologies helping to transform rice based food systems at the Uttar Pradesh International Trade Show organized at Greater Noida, Uttar Pradesh.

The event was attended by premiere public and private stakeholders in the agriculture sector showcasing their technologies as well as promotional and development schemes. Along with this, the event also provided a platform and opportunities for

enterprises in the state to showcase, sell, and expand reach to a wider audience.



Advisors to Uttar Pradesh Chief Minister at UPITS

Uttar Pradesh Minister of Agricultural Education and Agricultural Shri Surya Pratap Shahi & Additional Chief Secretary Dr. Devesh Chaturvedi visited the ISARC stall at the event. Also, advisors of Uttar Pradesh Chief Minister Yogi Adityanath, Mr. Awanish Kumar Awasthi, Dr. K. V. Raju, Dr. D. P. Singh, and Dr. G N. Singh visited the stall and interacted with ISARC scientists about the ongoing activities on the development and dissemination of new and nutrient-rich rice varieties, precision agriculture, and value-added product development from Kalanamak and black rice.



UP Agriculture Minister Shri Surya Pratap Shahi at ISARC stall in UPITS

September 28, 2023

A team of ISARC scientists led by Director Dr. Sudhanshu Singh presented the latest technologies and innovations at an event organized in Varanasi on

the occasion of the 33rd Inception Day of the Indian Institute of Vegetable Research.

Principal Secretary to the Prime Minister of India Dr. Pramod Kumar Mishra, Government of Uttar Pradesh Additional Chief Secretary, Agriculture, Agriculture Education & Research Deptt. & Agriculture Marketing, Agriculture Foreign Business & Export Promotion Dept, Govt. of U.P Dr. Devesh Chaturvedi, ICAR Deputy Director General (Crop & Horticulture Sciences) Dr. Tilak Raj Sharma and other delegates were also present at the event.

ISARC scientists showcased the activities of the institute in identification of low-glycemic rice varieties testing grain quality, nutrition and safety, promotion of DSR and stress tolerant rice varieties

(STRVs), development of Kalanamak rice value chain and innovative rice products.



ISARC director Dr. Singh explaining ISARC's activities in rice research and development to Principle Secretary to the Prime Minister of India, Dr. P.K. Mishra & other delegates

UPCOMING EVENTS

- 4th World Environment Summit 2023 (Conference & Awards) to be organized from 4– 5 November 2023 at Delhi University, North Campus, Delhi (India).
The event will be available in physical and virtual(Online) mode and the participants may join as per their suitability.
Read more about abstract submission and sub-themes at - <http://esdaindia.org/wes2023/about-the-conference/>
- International Conference on “Sustainable Natural Resource Management under Global Climate Change” to be organized from November 7- 10, 2023 at New Delhi.
Get more information about the event at - www.scsi.org.in



FEATURES

IRRI's role in transforming Assam's agriculture: an interview with ISARC director by The Assam Tribune

What are the main challenges of rice farming in Assam?

Rice farming in Assam faces a series of formidable challenges. Annual floods and relentless riverbank erosion wreck havoc, causing substantial crop losses in rice farming. The agrarian character of the state is dominated with 86% of the small and marginal farmers who jointly own on an average 0.63 ha landholding. The small and fragmented landholdings create difficulties in adopting modern technologies. Some of the other challenges are biotic and abiotic stresses, limited access to modern technologies, unavailability of quality seed, poor irrigation facilities, limited access to credit, markets and change in climate patterns.

What is the current area and production of rice in Assam?

During 2020-21, Assam had a total rice area of 2.36 million hectares (m ha) with total rice production of 5.21 million tons (mt) and average productivity of 2.21 t/ha, although there was a wide seasonal variability in area and productivity.

How is IRRI associated with the Assam rice sector?

For over six decades, a robust and enduring partnership has thrived between IRRI and Assam Agricultural University (AAU). This collaboration has encompassed various vital initiatives, including Shuttle Breeding program, Agri-Alliance program, and biotechnological interventions resulting in development and subsequent release of Stress Tolerant Rice Varieties (STRVs), such as Ranjit-Sub 1 and Bahadur-Sub 1. Furthermore, this collaboration has also prioritized human resource development in the field of rice research.

Since 2018, IRRI has been working as knowledge partner with AAU and Department of Agriculture (DoA) (Govt. of Assam) in the rice value chain through the World Bank funded Assam Agri-Business and Rural Transformation Project (APART).



IRRI South Asia Regional Centre Director Dr. Sudhanshu Singh

Is there any impact of climate change in paddy farming?

Assam is highly prone to the impact of climate variability and change, causing multiple hazards and disasters (e.g., soil erosion, landslides, cyclones, chronic floods, occasional droughts). Annual mean temperature in the state has increased by 0.59 degree Celsius over the last 60 years (1951-2010), and is likely to increase by 1.7-2.2 degree Celsius by 2050. Climate projections also predict that extreme rainfall will increase by 38%. The Assam State Action Plan for Climate Change (version 2.0, 2021-30) mentions that continued warming of the atmosphere and ensuing changes in precipitation pattern is impacting the State's water resources, agriculture, forest, its unique biodiversity and habitat where people live.

What are the varieties being promoted to mitigate the different climatic stresses in Assam?

IRRI with AAU and DoA has been promoting flood-tolerant rice varieties viz. Ranjit-Sub1, Bahadur-Sub1, Swarna-Sub1, and BINA Dhan 11. Since these improved varieties can withstand 14 days of submergence when other HYVs succumb, they become a lifeline for Assam farmers. Besides, high-yielding short-duration varieties (DRR Dhan 44 and

BINA Dhan 17) are being promoted in the drought-prone areas of Assam (~0.2 m ha).

What technologies are being promoted in Assam for increasing productivity and profitability of small and marginal farmers?

IRRI as a technical partner under APART has been promoting mainly stress-tolerant rice varieties (STRVs), alternative crop establishment methods (mechanical transplanting of rice, wet direct seeding of rice, mechanized dry direct seeding of rice), best management practices for STRVs and traditional rice varieties, and technologies for reducing the postharvest losses. Moreover, digital tools like Rice knowledge Bank-Assam, Rice Doctor-Assam and WebGIS have also been developed. Provisioning customized agro-advisory services to enhance the resilience of farmers is under process.

What are the steps being taken to reduce postharvest losses?

To reduce postharvest losses, IRRI has been consistently making efforts to promote mechanization in postharvest management viz. reaper and mini track-type combine harvester for harvesting, axial flow thresher and open drum thresher for threshing, solar bubble dryer and recirculating batch dryer for drying, portable rice mill for milling, and super bag and cocoon for storage.

As mechanisation is vital to increase productivity and to attract the young generation to the agri-sector, how is IRRI planning to facilitate mechanisation in Assam?

Due to predominance of small and marginal landholding and limited investment capacity, farmers of Assam face difficulty in procuring machines for agricultural use. Hence IRRI along with its implementing partners has promoted a total of 50 CHCs under APART, being operational through AAU (18 nos.) and DoA-ATMA (32 nos.). APART interventions have also created more than 400 private service providers (PSPs) for 11 different types of machines used in the rice value chain. These initiatives obviously help attract rural youths to engage themselves, and will contribute to higher productivity and income gains.



Custom Hiring Centre (CHC) in Assam

A significant area is left fallow after Sali rice. How is IRRI helping to increase cropping intensity in Assam?

Through GIS mapping, IRRI has developed the “Suitability Atlas for Rice-based Cropping System of Assam”, delineating the potential areas for growing mustard, pulses, vegetables, potato during rabi season, maize in rabi and spring seasons. IRRI has also emphasized on rice-fallow intensification by promoting short/medium duration rice varieties, alternative crop establishment methods, and machine intervention to promote early harvesting of Sali rice for timely sowing of the succeeding rabi crops through paira cropping or mechanized seeding. Moreover, a digital knowledge repository “Rice-based Cropping System Knowledge Bank” is also under the active phase of development.

Direct seeding of rice (DSR) is a potential technology of paddy farming getting popular in many countries. Is Assam suitable for practicing DSR technology?

DSR can't be deployed across all the rice ecologies of Assam. It can be potentially targeted in certain specific areas: (i) where farmers are traditionally practicing broadcast seeding (for example, parts of Sonitpur, Nagaon, Lakshmipur, Majuli, Dhemaji, Kokrajhar), (ii) Hill Region (Cachar, Karbi Anglong) for dry-DSR using short/medium duration varieties, and (iii) wet-DSR in post-flood situation. Long duration varieties (more than 140 days) can be established a bit early (second fortnight of May) through dry-DSR in Sali season (before onset of monsoon) to escape post-seeding inundation on account of heavy monsoon rains.

Climate-smart rice production approaches for sustainable agriculture

Developing climate-smart rice production technologies offers a promising strategy to combat climate change, increase rice yields, achieve sustainable agriculture, and help ensure long-term food security. These climate-smart technologies play a crucial role in mitigating climate risks while simultaneously becoming economically viable and reducing environmental footprints.

Mechanized DSR offers multiple benefits that enable early rice harvesting, timely sowing of seeds, and higher yields of succeeding crops such as wheat, chickpea, and mustard.

Rice, a staple cereal in the diets of more than half of the global population, including over 60% of India's population relying on it as a primary food source. However, its production is confronting a multitude of obstacles. India ranks as the world's second-leading producer of rice after China, contributing 24% to the global rice yield, but this sector faces a wide range of challenges that need to be addressed.

Inappropriate management practices, injudicious agricultural input use, and the impacts of climate change are negatively affecting natural resources, posing an imminent threat to global food security.

Severe climatic conditions, including recurrent droughts, floods, and high temperatures, are leading to crop failures that are adversely affecting the livelihoods of Indian farmers. The lack of knowledge and understanding on to these extreme climatic events further compounds their struggles. Moreover, the contribution of agriculture-related greenhouse gas emissions from the field burning of crop residues and unsustainable production practices further exacerbate these challenges.

It is crucial to prioritize a transition away from unsustainable agricultural practices towards climate-smart and sustainable approaches to effectively address the climate-related issues at hand.

The UN Food and Agricultural Organization defines climate-smart agriculture as a vision of how agricultural systems can be transformed and reoriented to support the development and ensure food security in a changing climate based on social, economic, and environmental factors, including agroecological zones.

When considering rice production systems, there is an



A progressive farmer operating zero till seed drill in his DSR field

opportunity to enhance profitability and sustainability by adopting climate-resilient and resource-efficient technologies. These include alternate wetting and drying technology, mechanized direct-seeded rice (DSR), laser land leveling, community-based staggered rice nursery enterprise, mechanically transplanted rice, site-specific nutrient management, integrated weed management, as well as crop residue management.

These climate-smart technologies play a crucial role in mitigating climate risks while simultaneously becoming economically viable and reducing environmental footprints.

For instance, the adoption of mechanized DSR offers multiple advantages, including 20-25% water savings, 40% labor reduction, lower production costs of approximately USD 120/ha, an increase in net profits of USD 100-125/ha, 20-44% a decrease in drudgery and global warming potential, and 7-15 days crop duration reduction.

These benefits enable early rice harvesting, timely sowing of seeds, and higher yields of succeeding crops such as wheat, chickpea, and mustard.

Developing climate-smart rice production technologies offers a promising strategy to combat climate change, increase rice yields, achieve sustainable agriculture, and help ensure long-term food security. This approach has the potential to double farmers' income while achieving UN 2030 Sustainable Development Goals, particularly Zero Hunger and Climate Action.

IRRI receives Google support to apply AI for climate resilient rice development

Leveraging the International Rice Genebank collection for a food-secure future

**LOS BAÑOS, Laguna, Philippines
(September 12, 2023)**

The International Rice Research Institute (IRRI) is receiving USD 2 million in grant funding from Google's philanthropic arm, Google.org, to harness the power of Artificial intelligence (AI) towards fast-tracking the development and deployment of high-yielding, climate-resilient rice varieties to sustain and increase rice production in the face of climate change.

Google's philanthropic arm, Google.org, has set up this competitive grant to harness the power of Artificial Intelligence (AI) to achieve the United Nations Sustainable Development Goals.

Through this grant, the researchers from IRRI's Fit-for-Future Genetic Resources unit that steward the International Rice Genebank (IRG) aim to apply a combination of AI and high-throughput phenotyping methodologies to assess the IRG rice collection's tolerance to abiotic stresses such as flooding, drought, and salinity – making a laborious, costly, and time-consuming process more efficient. This will also promote the enhanced utilization of the genebank's resources.

"IRRI's genebank is the world's largest rice gene bank and holds, in trust, over 132,000 varieties originating from 132 countries. This rich resource is used for breeding to develop new and better rice varieties. At present, only five percent of this resource is used due to limited information on its collections, as we lack appropriate, cost-effective, and high-throughput phenotyping methodologies. AI will undoubtedly unlock the genebank's full potential in helping address these critical food security challenges," said IRG Head, Dr. Venuprasad Ramaiah.

Google.org's AI for the Global Goals Impact Challenge is part of Google's company-wide commitment to help accelerate progress towards the UN's Sustainable Development Goals. IRRI is one of 15 organizations receiving support through the \$25 million philanthropy challenge for projects that use AI to accelerate progress towards these goals. Out



Scientist working in rice genebank at IRRI headquarters

of many submitted proposals, 15 were selected for funding. Importantly, all of the projects will be open-sourced so other organizations can build upon the work.

"Each of the 15 selected organizations share our vision for using AI to accelerate progress on the United Nations' Sustainable Development Goals, and each organization brings their own expertise to help move the needle," said James Manyika, Google's SVP of Research, Technology & Society. "We are inspired by the possibilities they see for how AI can be harnessed to help people solve societal problems, and are excited about the collective impact they will have over the next three years."

Based on projections, the IRRI team foresees economic returns of at least 30 billion USD from the project's implementation after five years from release. The project also presents an opportunity for the capacity strengthening of national research institutions' staff, which will bring further long term benefits.

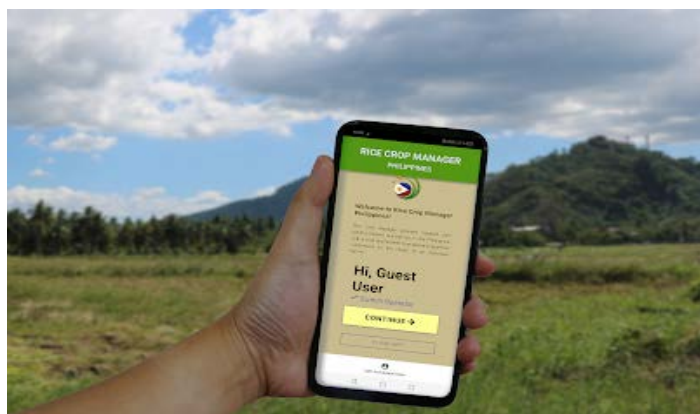
"The project is expected to bring a significant impact on food security and biodiversity conservation while promoting social, nutritional, gender, equity, and entrepreneurship benefits, and building the resilience of rice-growing and consuming countries to climate change. We thank Google for their support in this meaningful initiative," said IRRI Interim Director General, Dr. Ajay Kohli.

Rice app helps boost farmers' productivity and reduce greenhouse gas emissions in rice fields

Rice is known to be both a contributor as well as a victim of climate change. In 2021-2022, 510.3 million metric tons of rice was consumed worldwide, and with the increasing population, the demand will be more in the near future. Scientists are working toward the integration of climate-smart technologies into rice production to reduce the emissions of greenhouse gases (GHG) from rice fields and save it from the impacts of climate change. Chemical fertilizers used in rice fields result in emission of N₂O and flooded conditions emit CH₄; both the gases contribute to total agriculture GHG emissions of 13% and 10%, respectively.

In order to attain a sustainable yield from rice fields, it is recommended to apply chemical fertilizers. However, farmers tend to overuse nitrogenous fertilizers as they directly correlate the use of fertilizer with yield. Awareness on balanced use of fertilizers can help in getting the desired yield without causing significant damage to the environment.

The digital application *Rice Crop Manager* (RCM), developed by the IRRI, works on the principle of site-specific nutrient management and can be used to provide advisories to farmers on balanced fertilizer application. It was first developed for the farmers of the Philippines. The framework was then customized for Bangladesh, Indonesia and India. In India, it has been developed for rice growing farmers of Odisha, Bihar and Eastern Uttar Pradesh. To date, more than one million farmers have benefited through the use of RCM advisories. RCM helps farmers get the targeted yield, reduces input costs, reduces GHG emissions and contributes to integration of climate-smart agriculture practices in the rice production system. Farmers can get the advisories free of cost by using the application.



Partnership for wider reach

Farmers have reported an average of 0.5-1.0 tonnes per hectare (t/ha) increase in yield by following the advisories from the RCM application, following the “three Rs” of the technology: right time, right amount and right type. The application has been proven to be beneficial for farmers, and should be made available for all rice growing farmers. To achieve wider dissemination, the right partnership is required. IRRI has partnered with the Ministry of Agriculture, nongovernmental organizations, private partners, women groups and engaged rural youth for wider dissemination of RCM advisories in the regions where RCM has been developed.

In 2022, IRRI collaborated with Bayer Crop Sciences to scale out the benefit of RCM advisories to farmers of Odisha and Eastern Uttar Pradesh in India. *FarmRise* is an android application developed by Bayer that provides information on good agronomic practices for multiple crops, market prices, government schemes, etc. It is a multilingual application. The application programming interface of RCM has been integrated into the FarmRise application and the advisories for nutrient management for rice are being provided through RCM.

In order to scale out the digital application in rural India, partnership with multiple extension channels is required. Provision of RCM advisories on nutrient management through the FarmRise platform helps in serving a bundled package of information on seed-to-seed production systems to the farmers using a single application. Farmers are also sent reminders so as not to miss the window to fertilize the crop at the right time. A short feedback module has been added to capture the response of farmers about their experiences on using the application.

Innovative technologies can be brought at the doorstep of farmers through synergies between research institutes and various service providers, resulting in wider dissemination of the digital technologies.

WORKSHOPS & EVENTS

ISARC at G20 technical workshop on climate resilient agriculture

ISARC presents Climate Resilient Agriculture interventions at Hyderabad G20 technical workshop

SARC Director Dr. Sudhanshu Singh presented IRRI's role, activities and experiences in research and innovations related to Climate Resilient Rice Production at a G20 technical workshop on Climate Resilient Agriculture, held in Hyderabad. This workshop was organized on 4-6 September during which over 100 agricultural experts and officials from across the nation and around the world will present their insights on various aspects of climate resilient agriculture. During these three days, experts will also discuss global trends, issues, challenges, opportunities and initiatives, strategies for future & expectations from the G20 Nations in the area of climate resilient agriculture.

The workshop was inaugurated in the presence of Ms. Shobha Karandlaje, Hon'ble Minister of State for Agriculture & Farmers Welfare, Government of India, Dr. Himanshu Pathak, Secretary, DARE & Director General, ICAR, India, Ms. Alka Arora, Additional Secretary & FA (DARE), Mr. VK Singh, Director, ICAR-CRIDA. The workshop was chaired by Dr. SK Chaudhari, Deputy Director General (NRM) ICAR.

Dr. Singh gave an overview of IRRI's vision and goals aligned with climate resilient agriculture in rice-based cropping systems. Scientists at IRRI are constantly working towards developing advanced breeding techniques and tailored agronomic management practices to adapt to climate change. The recently established facility at ISARC- Speed Breed to quickly develop climate resilient varieties is one example.

To adapt to climate change and mitigate the risks related to GHG emissions, IRRI is developing and promoting various climate-resilient technologies including direct seeded rice (DSR), alternate wetting drying (AWD), stress tolerant rice varieties (STRVs), regenerative agricultural practices, site-specific nitrogen management, rice-straw management, Climate-smart mechanization, remote sensing technologies for targeting the climate resilient practices, system approach to avoid terminal heat

in wheat, etc



Dr. Sudhanshu Singh speaking at G20 technical workshop

IRRI is also facilitating Seeds Without Border initiative to promote unrestricted movement of seeds of climate resilient varieties across the countries and regions.

Dr. Singh pointed out that the need of the hour is to come together with strategy options and policy support to promote mitigation of risks related to climate change. He also emphasized on integrating these options in government support and schemes to maximize the benefits. He also emphasized that to fortify climate resilience in agriculture, a comprehensive approach is essential. This involves establishing a holistic framework to systematically instill climate resilience in smallholder farmers, bridging the gap between various standalone schemes. Engaging and strengthening the capacity of NARES partners and change agents is equally vital for implementing strategies that mitigate and adapt to climate change, ultimately building resilience in agriculture.

Through his presentation, he also talked about the carbon credit markets and IRRI role in developing carbon credit methodologies with major stakeholders such as Gold Standards, Verra etc. ISARC CESA Head Dr. Panneerselvam Peramaiyan was also present with Dr. Singh at the event.

ACTIVITIES AT A GLANCE



ISARC director Dr. Sudhanshu Singh at CORE national workshop, New Delhi (August, 2023)

A National Stakeholders Workshop of “Carbon Offsetting Rice Emissions (CORE)” Project was jointly organized by IRRI, GIZ, UN Women and Olam Agri, with the aim of introducing the CORE project to key stakeholders from across India, including those at the national and state levels, as well as representatives from various development agencies. The primary objective of this gathering was to harmonize CORE interventions with the broader national and regional contexts and to pinpoint opportunities for collaboration with partners. Additionally, the workshop sought to establish a shared strategic roadmap for the implementation and expansion of the CORE initiative in partnership with various stakeholders.

As a part of the high-level panel represented by Niti Ayog, Ministry of Agriculture, ICAR, IRRI, GIZ, Olam Agri, the German Embassy, and UNWomen, ISARC Director Dr. Sudhanshu advocated technical and policy aspects towards reducing greenhouse gas (GHG) emissions in rice cultivation. He highlighted IRRI's substantial contribution in generating scientific evidence and development of GHG emission reduction management practices and technologies.

ISARC conducted a 3-day training program for officials from The Directorate of Agriculture and Food Production. The program was organized as a part of Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA).

The aim of the visit was to expose the officials of OIIPCRA to the various agricultural innovation and climate-resilient technologies that will help them in dealing with the existing and emergent climate related constraints to improving productivity and profitability of agri-food systems in the state of Odisha. A total of 20 Participants underwent the training program.



OIIPCRA officials at a training program at ISARC Varanasi (September 26-28, 2023)



ISARC scientists with women farmers of Jayapur FPO

In Uttar Pradesh, Jayapur Seeds, a producer organization affiliated with UP Beej Nigam, has attained certification for their quality seeds, including Swarna Samriddhi, Swarna Shreya, and HUR 917. This achievement was made possible through their participation in the Early Generation Seed Production Program, a prominent initiative by IRRI SSPM. As part of this program, the farmer-led organization received foundational seeds and guidance, enabling them to successfully produce and certify highly marketable varieties. This accomplishment in UP signifies a promising path forward as the program gains momentum nationwide.

National and international delegates from Bayer Foundation, Shell Energy India Private Limited, and other experts congregated at experiment sites in India. IRRI and Bayer aim to develop a robust approach for greenhouse gas (GHG) reduction through this one-of-a-kind experiment conducted in the farmers' field. Complete demonstrations for water management, soil health monitoring, and monitoring GHG emissions were presented by IRRI scientists for the ongoing project.



ISARC scientists and stakeholders at experiment site in Devangere, Kerala (September 14, 2023)



Participants at business development workshops at Assam Agriculture University(September 12-13 & September 21-22, 2023)

Assam Agricultural University (AAU) and IRRI jointly organized two business development workshops under Assam Agribusiness and Rural Transformation Project (APART). The workshop aimed at enhancing the business acumen and opportunities for 50 participants from 25 Farmer Producer Companies (FPCs) of Assam by focusing on various facets of business development, particularly in the field of rice production.

Through this workshop, the participants got the understanding of basics related to Business Model Canvas and essential elements of a business plan.

Participants learned how to identify key partners, resources, and customer segments while understanding value propositions, revenue streams, and cost structures unique to their FPCs. Participants were also introduced to the potential of farm mechanization, especially through custom hiring centres (CHCs) and individual entrepreneurship. The workshop also included brainstorming sessions giving practical exercises to the participants for making strategic decisions based on real-life scenarios, enhancing their ability to make informed choices for their FPCs. The workshop also covered topics on paddy seed production, financial access and marketing and branding.

AAU and IRRI collaboratively organized a three-day Training of Trainers program for around 30 extension functionaries from Assam. In this training program the participants got an opportunity to gain valuable exposure to College of Agricultural Engineering and Technology, Orissa University of Agriculture and Technology, and the National Rice Research Institute. They also visited a successful DSR field and a seed processing unit to gain insights into seed processing techniques and best management practices.



Extension functionaries at training of trainers in Odisha (September 12-14, 2023)



*RCSKB stakeholder workshop in Jorhat, Assam
(August 3, 2023)*

The second stakeholder workshop of Rice-based Cropping System Knowledge Bank (RCSKB) with 41 participants was held in AAU, Jorhat. The participants included representatives from the Department of Agriculture, scientists from IRRI, WorldVeg, DRMR, and faculty of AAU from different colleges and centers, including College of Fisheries, College of Agriculture, KVKs, ZRSs and HRS. The content for the proposed RCSKB was streamlined and finalized by the RCSKB Knowledge Management Committee. A draft version of the proposed website framework was shared with the participants during the workshop. Keeping in mind the current practices of farmers across all districts of Assam, the participants took a unanimous decision to include other vegetable crops (cabbage, cauliflower, brinjal and okra) in addition to tomato and pumpkin in the list of vegetable crops previously included for the proposed RCSKB.

In pursuit of strengthening the strategic linkages between ISARC in Varanasi and the APART implementing agency, Assam Agricultural University (AAU), an exposure-cum-training program was conducted at ISARC, Varanasi. The teams visited different facilities at ISARC viz., grain quality lab, Speed Breed Center, Farm Machinery Hub and GIS Lab followed by a productive interaction with the scientists at ISARC.



*Scientists from AAU at ISARC Varanasi
(September 27-29, 2023)*

ANNOUNCEMENTS

Post-Harvest Excellence: Introducing 5 New Micromodules

Introducing five new micromodules (Rice Milling, Drying Process, Threshing, Solar Bubble Dryer, IRRI Super Bag) available at openlearning.cgiar.org. These additions aim to enrich your knowledge and skills in post-harvest management, providing a comprehensive understanding of the latest techniques.



Hindi Micromodules: 15+ Under Expert Review

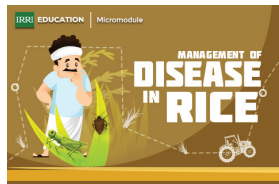
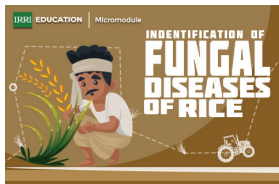
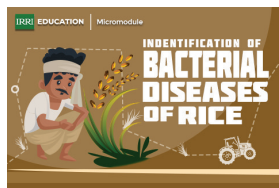
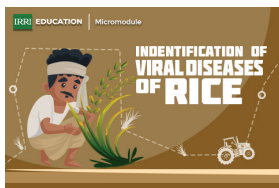


Breaking language barriers, over 15 Hindi micromodules are currently undergoing expert review. Soon, these resources will be accessible on the portal, ensuring a wider reach and inclusivity in disseminating agricultural knowledge.

Innovative Learning: Pilot Testing of Blended Mode Research Proposal Writing Course

A research proposal writing course conducted in a blended mode has successfully undergone pilot testing. This course is now gearing up for a wider launch, opening opportunities for a broader audience to enhance their research skills.

Advancements in Disease Identification and Management: Micromodules Under Review



The online learning and product development team introduced a series of micromodules on Disease Identification and Management are currently in the review phase. These educational resources are set to be uploaded soon, promising valuable insights into cutting-edge practices.

CERVA labs offering grain quality analysis and safety services

The laboratories under the Centre of Excellence in Rice Value Addition at ISARC have acquired accreditation in accordance with the standard of the International Organization for Standardization (ISO/IEC 17025: 2017) by the National Accreditation Board for Testing & Calibration Laboratories (NABL) in the field of grain quality testing. CERVA laboratories are now open to accept samples from our diverse internal and external stakeholders for grain quality analysis of rice and measuring food safety aspects in different food matrices.



We want to hear from you!

As our valued partner in South Asia, we would like to hear your thoughts about ISARC Cultivate.

Please scan this QR code to give us your feedback on the newsletter.



FEATURED PUBLICATIONS

Plant Science, Volume 336, 2023, Article 111864

Cadmium and Zn hyperaccumulation provide efficient constitutive defense against Turnip yellow mosaic virus infection in *Noccaea caerulescens*

Morina F, Mijovilovich A, Mishra A, Brückner D, Vujić B, Bokhari SNH, Špak J, Falkenberg G, Küpper H.



AgriLinks , September 2023

Site-Specific Nutrient Management for Balanced Nutrient Application and Reduced Greenhouse Gas Emissions in Rice Fields

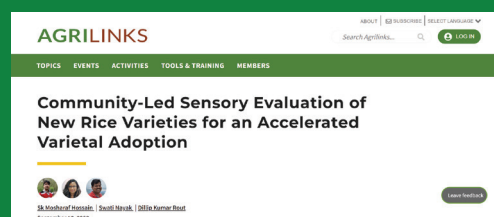
Preeti Bharti, Sheetal Sharma and Ajay Kumar Mishra



AgriLinks, September 2023

Community-Led Sensory Evaluation of New Rice Varieties for an Accelerated Varietal Adoption

Mosharaf Hossain, Swati Nayak, and Dillip Kumar Rout



Village Square, September 2023

Women reap success with rice seed business in Odisha

Mosharaf Hossain, Swati Nayak and Girija Prasad Swain







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