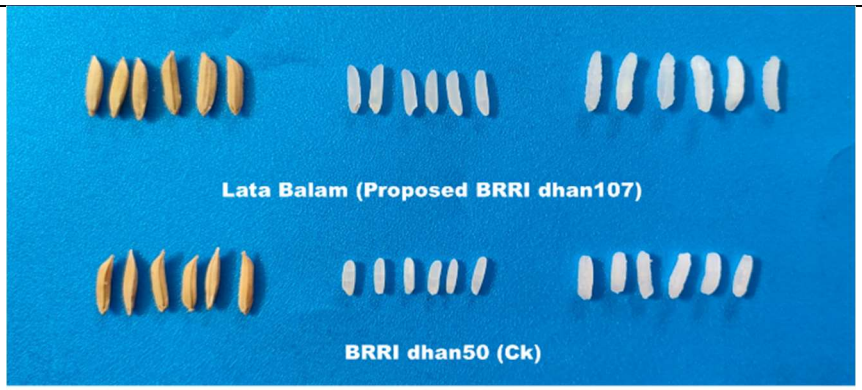
Research Achievement 2023-2024

Program Area: Varietal Development program (VDP)

Plant Breeding Division

Research Achievement 2023-2024
(Technology Developed)

Sl. No.	Technology Developed	How Country/Farmer /User will be benefited
	Program Area: Varietal Development program (VDP)	
1	**BRRI dhan107:** Lata Balam was approved to release as BRRI dhan107 for cultivation throughout the country for Boro season by the National Seed Board (NSB) of Bangladesh in its 111th meeting held on January 09, 2024. The average yield of BRRI dhan107 was 8.19 t/ha with 143 days growth duration which gave 17.67% higher yield in ten locations than BRRI dhan50. The grain quality of the rice is excellent. BRRI dhan107 is a new premium quality high protein (10.02%), high yielding rice variety, and the size and shape of this variety is extra-long slender. The color of the rice grain is straw and the milled rice is extra-long slender and white. BRRI scientists expect that being a high yielding high protein premium quality rice variety, BRRI dhan107 will gain popularity very quickly at farmers' level as the same time it is capable to meet up nutritional demand and earn foreign currency through export. 	BRRI scientists expect that being a high yielding premium quality aromatic rice variety, BRRI dhan107 will gain popularity very quickly at farmers' level as the same time it is capable to earn foreign currency through export.

		
2	**BRRI dhan108:** CSISA and NATP-PIU-BARC projects applied ideotype breeding approaches and developed several high-yielding fine-grain genotypes. Subsequently, multi-location yield trials (RYT, ALART, PVT) were conducted during the Boro season to identify the best performing high-yielding fine-grain genotype. Based on the results, the National Seed Board (NSB) approved BRRI dhan108 in 2024 for commercial cultivation during the Boro season across the country. BRRI dhan108 was developed from a single cross between two breeding lines: IR 80561 (fine grain) and Chinese inbred 321 (high yielding), with the objective of developing a high-yielding Jira-type variety. The pedigree of BRRI dhan108 is BRH11-9-11-4-5B, with a yield potential of about 10 t/ha and medium-slender grains. BRRI dhan108 has an average yield of 8.5–8.7 t/ha, but under optimum management it can produce 9.5–10.0 t/ha, with a growth duration of 149–151 days. This new high-yielding variety is characterized by an erect flag leaf, 8.8% protein content, 24.5% amylose content, 1000-grain weight16.3 g, and Jira-type grain characteristics. 	Rice is the major crop in Bangladesh; however, the income generated from rice cultivation is comparatively low. Improving grain quality is important as it enhances consumer welfare and expands market opportunities. In recent years, scientists and breeders have increasingly focused on improving rice quality to meet the diverse needs of different purposes and markets. In Bangladesh, there is a strong domestic demand for fine-grain Jira-type rice. BRRI dhan108 meets this market demand and can help reduce the import of fine-grain rice varieties.

3	**BRRI dhan109:** The National Seed Board (NSB) of Bangladesh has released the breeding line BR9158-19-9-6-50-2-HR1 as tidal submergence tolerant variety viz BRRI dhan109 for tidal submergence prone environment of Barisal region to be cultivated during T. Aman season. The average yield of BRRI dhan109 is 6.0 t/ha with a growth duration of 147 days. Under standard cultivation practice, this variety can produce 6.5 t/ha. It has high protein content (10.6 %) and high amylose content (25.4%). The thousand grain weight of this variety is 31.0 gm having medium bold grain which is mostly preferred by the farmers of Barisal region. 	Approximately 2.5 million hectares of land in Bangladesh face critical challenges due to tidal flooding, which poses a serious threat to rice cultivation in coastal regions. In these areas, agricultural land is inundated daily by river water, making traditional cultivation difficult. The rice variety BRRI dhan109 has been specifically developed for such tidal submergence-prone environments and demonstrates the ability to deliver higher yields under these conditions. It's cultivation offers a viable solution for farmers in coastal areas, thereby contributing to enhanced food security and agricultural resilience.

4	**BRRI dhan110:** The National Seed Board (NSB) released flash flood submergence tolerant genotype, IR16F1148 as a short duration submergence tolerant variety for submergence prone farmers' field of Bangladesh as BRRI dhan110 to be cultivated during T. Aman season. This variety having *Sub1* gene can tolerate three weeks of complete submergence and can produce 5.0 t/ha yield. Under rainfed condition, the average yield is 6.0 t/ha with a growth duration of 123 days. Depending on the flood duration the growth duration may be increased up to 140 days. With standard agronomic practice it can produce 6.65 t/ha yield. This variety can produce medium slender white grain having medium amylose content. The rice is white, non-sticky which is very good to taste. The weight of 1000 grain is 19.9 grams.  	In Bangladesh, over 2.0 Mha of agricultural land are regularly affected by varying levels of submergence or flash floods, with water depths and durations ranging from one to six weeks. Such flooding often results in partial to total crop damage, leading to significant yield losses. The greater Rangpur region, including districts such as Lalmonirhat, Kurigram, and Gaibandha, is particularly vulnerable to flash floods. The rice variety BRRI dhan110 has been developed, which can withstand up to three weeks of submergence and has a shorter growth duration. This variety offers a promising solution for farmers in flood-prone areas, contributing to enhanced food security and livelihood stability.
5	**BRRI dhan111:** The National Seed Board (NSB) released BRRI dhan111 (BR10260-5-15-21-6B) for shallow flooded condition of up to 80-100 cm water depths to be cultivated in tidal flood prone coastal region and shallow flood prone haor region of Bangladesh. This variety can produce 4.7 t/ha yield under shallow flooded condition but can give 5.7 t/ha yield under non-stress condition. BRRI dhan111 is taller but stronger and photosensitive with a growth duration of 146 to 160 days. The plant height is 162cm having a very strong culm which is tolerant to lodging and have ratooning ability. It has high amylose content with medium bold grain having 100-grain weight 27.5 g.	Approximately 0.48 Mha of crop land in Bangladesh are covered by deepwater and semi-deepwater (<100 cm water depth). BRRI dhan111 has been developed to address the low yields typically associated with traditional landraces cultivated by farmers in these areas. This variety is specifically designed for semi-deepwater

		ecosystems, aiming to ensure more stable and improved rice production under such challenging conditions.
6	**BRRI dhan112:** The National Seed Board (NSB) of Bangladesh has released BRRI dhan112 (BR11716-4R-102), a new salt-tolerant rice variety for the T. Aman season. This variety has a growth duration of 120–125 days and characterized by good lodging tolerance. It produces an average yield of about 5.0 t/ha, with a potential yield ranging from 4.14 to 6.12 t/ha depending on the level of salinity stress. Compared with the check variety BRRI dhan73, BRRI dhan112 provides a yield advantage of about 1.0–1.5 t/ha (approximately 22% higher yield). A key feature of BRRI dhan112 is its strong tolerance to salinity, with the ability to withstand up to 12 dS/m during the critical seedling stage (up to three weeks). In addition, it can tolerate salinity levels of up to 8 dS/m during other salt-sensitive growth stages, from the vegetative to the reproductive phase, while maintaining high yield performance. These characteristics make BRRI dhan112 a promising variety for sustainable rice production in the saline-affected coastal regions of Bangladesh.	BRRI dhan112 will not only improve farmers' income and livelihood security but also reduce crop losses, expand cultivation in underutilized saline lands, and lower reliance on rice imports. By promoting sustainable, climate-resilient agriculture, BRRI dhan112 is set to play a crucial role in ensuring national food security and economic stability.

		
7	**BRRI dhan113:** The breeding line BR11337-5R-72 was approved for release as BRRI dhan113 by the National Seed Board (NSB) of Bangladesh in its 113th meeting held on September 5, 2024, for cultivation across the country during the Boro season. BRRI dhan113 has an average yield of 8.15 t/ha but it can produce 10.1 t/ha under optimum management with a growth duration of 143 days, producing 11.5% higher yield than BRRI dhan88 across ten locations. This new short-duration, high-yielding rice variety is characterized by an erect flag leaf, 8.4% protein content, 19.4 g 1000-grain weight, and medium-slender grain type. 	BRRI scientists anticipate that BRRI dhan113, owing to its high yield potential and shorter growth duration, will rapidly gain popularity among farmers and play a significant role in strengthening national food security.

Genetic Resources and Seed Division

Research Achievement for 2023-24 from Genetic Resources and Seed Division, BRRI

- Two collection missions were made during the reporting year and 756 rice germplasm of which 274 in Aus, 371 in T. Aman, 63 in B Aman, 47 in Boro seasons and one wild rice were collected from different districts of Bangladesh.
- One hundred and sixty-three germplasm accessions and new collections (NC) of which of which 36 in T. Aus 2023, 80 in T. Aman 2023 and 47 in Boro 2023-24 were morphologically characterized using 'Rice Germplasm Descriptors and Evaluation Form' of GRSD.
- Rejuvenation of 2,532 accessions including 526 accessions in T. Aus 2023, 1357 in T. Aman 2023 and 649 in Boro 2023-24 seasons was completed.
- In total, 138 new germplasm accessions were registered as new accessions (from accession number 8,869 to 9,006) in BRRI Genebank after processing and duplicate sorting.
- In total, 3,872 samples of rice germplasm and BRRI developed rice varieties were supplied to 30 different users in the reporting year.
- A total of 383 rice germplasm accessions have been purified based on GBS profiling (97% homology) and selected for downstream analysis.
- Three accessions of Rosul Bhog (Acc. 338), Joysail (Acc. 5969) and Ganjia (Acc. 287) showed better performance out of 15 evaluated under late (transplanting 15 September) condition in T Aman 2023 season.
- One hundred and twenty-five BRRI developed and recommended rice varieties were maintained through nucleus seed production. Besides, nucleus seeds of 73 varieties were produced to be used as the source of breeder seed (BS).
- In total 294.07 tons of breeder seed with tags of which 193.65 tons of 20 Boro varieties, 16.72 tons of seven Aus varieties and 83.70 tons of 35 T. Aman varieties were produced during 2023-24. At the same time, 249.08 tons of breeder seed of which 158.50 tons of 20 Boro varieties, 11.86 tons of seven Aus varieties and 78.73 tons of 35 T. Aman varieties were distributed among 645 partners (GO, NGO and PS) of 'BRRI Rice Seed Network'.

Program Area: Farm Mechanization and Postharvest Technology

Farm Machinery and Postharvest Technology Division

Research Achievement 2023-24

BRRI solar powered bird repellant

Raspberry Pi 4 and YOLOv8n-Based Bird Repellent

- Improved detection range and the ability to distinguish between birds and other objects.
- The camera, mounted on a stepper motor, allowed for dynamic area scanning.
- Enhanced accuracy in detecting birds, activating deterrent measures based on real-time data.

Key Components of the Bird Repellent System

The bird-repellent system consists of two main units: a bird-repellent unit and a solar power system.

- **Bird-repellent unit**: This uses a Raspberry Pi 4 processor, a camera, and machine learning to detect birds and activate sound deterrents.
- **Solar Power Unit**: This unit provides continuous power and consists of a solar panel, charge controller, battery, and inverter.

The development of the solar-powered bird-repellent system has led to significant advancements in bird control for rice farmers. This version automatically integrates machine learning and dynamic scanning and offers greater accuracy and broader coverage. Due to its enhanced detection capabilities, this version is recommended for large-scale or precise bird deterrence.

Program Area: Socio-Economic and Policy

Farm Management Division

Research achievement 2023-2024
(Technology developed)

SL. No.	Technology Developed	How Country/ Farmers/User will be benefited
	Program Area: Socio-Economics and Policy	
03	**Farm Management Division**	
	3.1. Influence of different dates of transplanting on growth, yield performance and quality of fine rice varieties In T. Aman season, 30 July to 30 August transplanting plants produced statistically identical yield of tested fine rice varieties. In Grain qualities parameters, Milling outturn (%), head rice (%) and protein content (%) were produced higher in 30 July to 15 August transplanting.	These finding may be useful for the rice growers and researchers.
	3.2. Effect of storage times in different storage technologies on quality of rice If seed are kept in Plastic Container and Grain Pro Bag for up to 6 months after harvesting, seed quality, grain quality and vitamins (B- Complex) levels are good.	This finding may be useful for the rice growers and researchers/ production farm.

Program Area: Technology Transfer

Training Division

Research Achievement 2023-24

	Technology Developed	How country /Farmer/User will be benefited
	Program Area : Technology Transfer Program Performing Unit : Training Division	

I	1. Technology Transfer through training	Knowledge and skill of the trained personnel of the subject matter will be increased.
	Total training conducted: 51 No. of participants : 1113 Duration : 1 week to 1 month Participants : GO/NGO officers and farmers.	1. Knowledge and skill on rice production technologies will be enriched. 2. Rice yield and production of the country will be increased.

Program Area: Regional Station

Regional Station, Gopalganj

Research Achievement 2023-24

Sl. No.	Technology Developed During 2023-24	How Country/Farmer/User will be benefited
1	**Field validation of blast resistant rice germplasm of Bangladesh.** Eleven genotypes were tested. None of the genotypes get blast disease at all.	The genotypes could be used as a source of donor plant.
2	**Breeder seed production.** BRRI dhan87= 2250 kg BRRI dhan74= 1450 kg BRRI dhan87= 1300 kg	Breeder seed is the perquisite for foundation and certified seed.
3	**Certified seed production.** BRRI dhan100= 8000 kg	The seed will give support of the farmers directly for good seed.
4	**Free seed distribution to the farmers** BRRI Hybrid dhan3= 1000kg BRRI Hybrid dhan4= 750kg BRRI Hybrid dhan5= 1000kg BRRI Hybrid dhan6= 750kg BRRI Hybrid dhan7= 700kg BRRI Hybrid dhan8= 1000kg	The seed will give support of the farmers directly for good seed.