Research Progress 2023-2024

Sl. No.	Program Area/Project/ Experiment Title & Research Progress of 2023-24	Major Output
	Program Area: Varietal Development program (VDP)	
	Plant Breeding Division	
	1. Rice Breeding	
1.1	**Development of Upland Rice (B. Aus and Jhum rice)** In 2022-23, Thirty-nine crosses were made using twenty-six promising parental genotypes from local Jhum cultivars namely Vandana, Hasikalmi, Kalobinni, Gallong (pure); exotic varieties (Luyin-46, China-70 ACC 7/70); BRRI varieties (BR24, BRRI dhan83); promising advanced breeding lines (BR13113-4R-63, BR12248-4R-22, BR12239-4R-183, BR1116-4R-102, BR13115-4R-116, BR12263-4R-75, BR13125-4R-92, BR10756-2B-8-72, BR13113-4R-63, BR13122-4R-136, BR12873-5R-65, BR12235-5R-10, BR12239-4R-201, BR13108-4R-232, BR13106-4R-38 and BR12248-4R-18) having good performance in terms of yield in rainfed situation, drought tolerance capacity and other remarkable traits following respective product profile. Eleven crosses were confirmed as true F^1 out of seventeen crosses. A total of 17570 progenies obtained from 14 crosses of F2-F5 generation were advanced through field RGA. In OYT trial, thirty-four entries were selected out of 64 advanced breeding lines considering growth duration, yield, uniformity of morpho-agronomic traits and superiority in one or more traits over the standard checks. Sixteen genotypes such as BR12857-5R-55, BR12857-5R-112, BR12858-5R-116, BR12859-5R-31, BR12860-5R-79, BR12862-5R-3, BR12867-5R-125, BR12873-5R-60, BR12873-5R-65, BR12873-5R-73, BR12874-5R-33, BR12876-5R-37, BR12876-5R-40, BR12880-5R-266, BR12880-5R-291, BR12880-5R-308 were selected from 27 tested entries on the basis of yield and short growth duration in PYT. In AYT, six genotypes were selected namely, BR12236-5R-6, BR12248-5R-22, BR12248-5R-37, BR12248-5R-122, BR12263-5R-75 and BR10756-2B-8-72 from thirteen advanced lines.	For B. Aus, promising high yielding (4.0-4.5 t/ha) lines/ varieties will be developed with multiple traits such as quick seedling emergence, vigorous growth, shorter growth duration (90-100 days); tolerance to lodging and drought and pre-harvest sprouting tolerance; medium bold to medium slender grains and good eating and cooking quality. For Jhum rice, high yielding rice variety with low (10-19%) to high (>25%) grain amylose content and drought tolerance along with less fertilizer use efficiency, good eating quality acceptable to tribal people of Chattogram hill districts following their traditional cultivation practices (Dibbling method of planting associated with other crop species) will

		Improvement of jhum rice under upland rice program was implemented to develop high yielding rice variety with low (10-19%) to high (>25%) grain amylose content and drought tolerance along with good eating quality for jhum cultivation acceptable to tribal of Chattogram hill districts. Thirty-nine crosses were made using twenty-six promising parental genotypes from local Jhum cultivars, BRRI varieties and promising advanced breeding lines having good performance in terms of yield in rainfed situation, drought tolerance capacity and other remarkable traits following respective product profile. Seventeen crosses were confirmed as true F_1. 12000 progenies from six F_2 population were grown for generation advance through field RGA (Rapid generation advance). A total of 3220 progenies obtained from 6 crosses of $F_{4:5}$ generation were advanced through field RGA. 301 fixed lines were selected out of 1862 LST lines for next season OYT trial. In the reporting year, four genotypes were selected out of 22 genotypes in PYT-1 trial. No entries were selected in PYT-2 due to poor performance better than the check varieties. An advanced yield trial was conducted in six locations of three hilly districts (Khagrachari, Rangamati and Bandarban) of Bangladesh. Ten genotypes including BRRI dhan43, BRRI dhan55, BRRI dhan65, BRRI dhan69, BRRI dhan83 as standard check were evaluated. 8 genotypes were selected among the tested genotypes in AYT-1. Two genotypes were selected out 9 genotypes in AYT-2 trial.	be developed.
1.2	**Development of T. Aus** In total, 30 crosses were made using 42 parents and 4,127 F_1 seeds were obtained; 25 crosses were confirmed as true F_1 out of 29 crosses; 46,400 progenies of 77 crosses in T. Aus season were advanced through modified field rapid generation advance (FRGA) technique. Out of 3700 lines, 256 uniform lines were identified from LST based on uniformity in heading, plant height, and acceptable grain type in the field condition. Finally, 245 fixed lines were selected from 256 lines on the basis of trait genotyping with 12-SNP indica panel. Fifty-one genotypes were selected out of 674 entries in observational yield trial (OYT), thirteen advanced lines were selected out of 40 from AYT#1 and AYT#2 for T. Aus growing areas of Bangladesh on the basis of homogeneity with respect to plant height, phenotypic acceptability at vegetative and maturity stages and physicochemical properties. Three genotypes were selected from RYT. 150 Advanced breeding lines, local and exotic germplasm were maintained under maintenance breeding program.	Promising lines/ varieties will be developed with better yield potential (5.0–5.5 t/ha) and shorter growth duration (105-110 days) in comparison to existing varieties alone with tolerance to lodging and heat (high temperature) at the reproductive phase, pre-harvest sprouting and good grain quality.
1.3	**Development of rice for shallow flooded and deep-water environment** In total, 20 crosses were made by using 21 parents and produced 2,700 F_1 Seeds. In total seventeen F_1s crosses were confirmed through QC SNP panel analysis. A total of 13,754 progenies from 75 crosses (3,064 progenies of 15 F_2 crosses, 3,295 progenies of 19 F_3 crosses,	High yielding (4.0-5.0 t/ha) rice varieties for shallow flooded area (up to 1.0 m depth), shallow deep area (30 cm water)

	3,541 progenies of 20 F_4 crosses, 1,881 progenies of 19 F_5 crosses) were advanced through RGA. In yield trials, 37 genotypes were selected out of 99 genotypes. In OYT trial, the genotype BR11186-5R-119 gave highest yield (3.5 t/ha) which is significantly higher than the check variety BRRI dhan91 (1.8 t/ha) whereas in AYT the genotype BR11186-5R-549 (3.5 t/h) gave highest yield which was significantly higher than the check variety BRRI dhan91 (1.7 t/ha). The heritability obtained for growth duration was ranging from 82% to 88% and grain yield was ranging from 61 % to 74% indicating acceptable level of precision in these experiments. Through maintenance breeding 15 shallow flood tolerant genotypes and landraces were grown and maintained for future breeding purpose. Two lines namely BR10230-7-19-2B-3 (1.62 t/ha) and BR9390-6-2-1B (1.87 t/ha) were evaluated in the ALART under deep water (100-150 cm) condition. None of the lines were recommended for PVT. On the other hand, BR10260-5-15-21-6B was evaluated in PVT trial and this line produced 1.45 t/ha more yield than the check variety BRRI dhan91. However, the PVT material was suggested to evaluate as re-trial due to damage of crops in three locations. In T. Aman (stagnant water) 2023-24, RYT#Tall materials were evaluated with four breeding lines and check BRRI dhan91. The highest yield was observed in the advanced line BR9892-8-2-2 (3.90 t/ha) followed by the line BR10247-14-18-7-3 (3.59 t/ha) and BR10238-5-1-9-2B (3.30 t/ha).	and medium deep area (50-60 cm water) along with submergence, facultative elongation and hypoxia tolerance will be developed.
1.4	**Development of Rainfed Lowland Rice (RLR)** The project aims to develop genotypes superior to standard varieties and adaptable to rainfed lowland environment in T. Aman season. In T. Aman, 2,892 F_1 seeds were obtained from 30 single crosses and 30 crosses were confirmed as true hybrids using 10-SNP *indica* QC panel. A total of 18,920 individual progenies of 59 crosses from F_3 and F_5 generations were harvested from T. Aman season through RGA method. The materials were advanced in Boro 2023-24 season and and 11,710 progenies of 36 crosses from F_4 generations were harvested in Boro season at Gazipur through RGA method. A total 64 genotypes were selected from 606 progenies of Line Stage Testing (LST) trial. A total of 432 genotypes were evaluated in three Observation Yield Trials (OYTs) in Gazipur, Cumilla and Rangpur. Among the tested genotypes 40 genotypes were selected and forwarded in Advanced Yield Trial (AYT). In Advanced Yield Trial (AYT) 104 genotypes were evaluated in two trials in Gazipur, Cumilla and Rangpur and 20 genotypes were found promising advanced. Among the 16 tested genotypes of Regional Yield Trial (RYT), three was selected for re-trial. Genetic trend of the genotypes from 2019 to 2023 showed the pBLUP (grain yield) in respect of trial year indicated an annual 77.67 kg/ha equivalent to about 1.67%	Short duration varieties (105-115 days) with 4.5-5.0 t/ha yield potential and medium duration (116-130 days) varieties with 6.0-7.0 t/ha yield potential will be developed.

		increase in grain yield per year based on yield of 2019.	
1.5	**Development of Salt Tolerant Rice (STR)** The objective of this project is to develop high yielding salt tolerant rice cultivars based on product profile. Salinity is one of the major constraints for the Rainfed lowland and Boro rice ecosystem in the southern coastal zone of Bangladesh. In T. Aman season, 60 crosses were made using 138 well characterized elite parents with higher genetic merit/breeding values and various alleles of interest. A total of 45 F_1s were confirmed as true hybrids through hybridity test via F_1 verification by quality check (QC) genotyping with purity SNP panel during T. Aman season. In FRGA (F2-F5) nursery, a total of 67,207 progenies were harvested from 115 crosses. In LST, 750 lines were selected on the basis of strong culm with good plant ideotype, acceptable grain type and uniformity at heading in field condition using 41 crosses. Yield trials were carried out in Gazipur, Koikhali, Kaliganj and BRRI Farm, Satkhira in T. Aman season. Out of 450 genotypes, 99 genotypes were selected from OYT. Three PYTs (PYT-1 to PYT-3) were conducted using 232 breeding lines by following alpha lattice design. Sixty-two genotypes were selected from these trials depending on grain yield, salinity tolerance and phenotypic acceptability. Twenty-five genotypes, out of 107 genotypes were selected from AYT-1 and AYT-2. In RYT's (RYT-1 to RYT-3), out of 47 breeding lines, seven best performing lines were selected.	Promising Salt tolerant lines/salt tolerant varieties will be developed with seedling stage (EC 14 dS/m) & reproductive stage tolerance (EC 8-10 dS/m) and better yield potential (5.5-6.5 t/ha for the T. Aman and 7.5-8.0 for Boro season) in comparison to existing varieties	
1.6	**Development of premium quality rice (PQR) and Photosensitive** **For T. Aman** Efforts were made to develop aromatic and non-aromatic fine-quality rice with national and international standards (Kalizira/ Chinigura /Kataribhog /Radhunipagol/Jasmine type) and photosensitive rice for domestic use and export. In T. Aman 2023-24, 44 crosses (17 single crosses and 14 backcrosses for PQR and 13 single crosses for photosensitive rice) were made. Total 28 crosses (18 for PQR and 10 for photosensitive rice) were confirmed as true hybrids using quality control SNP panel analysis. A total of 36963 progenies from 120 crosses (**20133** progenies of 32 F_2 crosses, 10564 progenies of 43 F_3 crosses, 4277 progenies of 26 F_4 crosses and 1989 progenies of 19 F_5 crosses) were advanced through RGA under PQR. A total of 14684 progenies from 48 crosses (10320 progenies of $23F_2$ crosses, 2812 progenies from $10F_3$ crosses, 700 progenies from five F_4 crosses and 852 progenies from $10F_5$ crosses) were advanced through RGA under photosensitive program. Under, PQR a total of 152 fixed lines were selected from 1962 fixed lines of 28 crosses from LST. From Observational Yield Trial (OYT) 11 genotypes were selected out of 35 genotypes	National and international grade (Kalizira, Chinigura, Kataribhog, Basmati, Jasmine, Banglamati and BRRI dhan34 type) high yielding aromatic varieties with earliness, good plant type, anti-oxidant potential will be developed.	

from PQR and from Observational Yield Trial (OYT) seven genotypes were selected out of 21 genotypes from Photosensitive. From Preliminary Yield Trial (PYT), a total of four genotypes were selected out of eight genotypes under PQR program. A total of seven genotypes were selected out of 14 in AYT and seven genotypes were selected out of seven in AYT_special under PQR program and seven genotypes were selected out of 11 genotypes under Photosensitive rice breeding program from Advanced Yield Trial (AYT). In RYT, a total of four genotypes were selected out of eight genotypes under Photosensitive program.

Development of Antioxidant Enriched Rice Variety, T. Aman
The main objective of the project was to develop anthocyanin enriched value-added rice genotypes with high yield potential for rainfed and irrigated ecosystems in Bangladesh. In T Aman 2023-24, a total of 34 crosses were made using 26 parents and 1850 F_1 seeds were obtained, and 31 single crosses were selected and confirmed through QC SNP panel analysis. Panicles of 16,081 progenies from 41 crosses (5011 progenies of six F_2 crosses, 8252 progenies of twenty-three F_3 crosses, 2038 progenies of eight F_4 crosses and 780 progenies of four F_5 crosses) were advanced through RGA. A total of 44 fixed lines from 291 fixed lines were selected from five crosses of LST. In OYT, 51 genotypes were selected out of 245 (two trials) aromatic and non-aromatic genotypes. 66 advanced lines under two OYT (OYT-1 and OYT-2) were evaluated. 17 lines were selected among the tested OYT lines. 25 advanced lines under two AYT (AYT-aromatic and AYT-non aromatic) were evaluated. 15 lines were selected among the tested AYT lines. Twelve advanced lines under two RYT (RYT-aromatic and RYT-non aromatic) were evaluated. Six lines were selected among the tested RYT lines and three lines were promoted to next T. Aman season ALART. Two lines were evaluated in ALART trial, whereas Advanced line BR12836-4R-63 were promoted to PVT trial for T. Aman 2024-25.

1.9	**Development of Zinc Enriched Rice (ZER)**	
	The project aims to develop high yielding rice varieties with improved nutritional quality with high zinc (Zn≥24 mg/kg) in polished grain. The project also prioritizes development of stress tolerant zinc enriched rice varieties in a combination of submergence + zinc, drought + zinc, salinity + zinc and cold + zinc enriched rice with improved grain yield. The experiments were conducted in both T. Aman and Boro seasons. In T. Aman season, 19 single crosses were made that produced 4437 seeds. A total of 16 crosses were selected and confirmed as true F1s. In RGA method, 29,463 segregating progenies were harvested from F2 to F5 generations of 121 crosses.	Rice varieties with high iron and zinc content with resistance to major insect pests and diseases and acceptable grain quality will be developed.

	Initially 363 uniform lines out of 6207 LST lines were harvested based on visual observation on homogeneity in flowering, plant height and grain size and shape. From the Observational Yield Trial (OYT), 56 genotypes were selected from 220 genotypes. A total of 07 genotypes were selected out of 15 genotypes from the PYT based on yield performances. Only two promising genotypes were selected out of 08 genotypes from the SYT. None of the entries were recommended for promoting from RYT.	
1.10	**Development of Insect Resistant Rice (IRR)** The main thrust of the project was to develop varieties resistant to gall midge (GM), brown plant hopper (BPH) and white backed plant hopper (WBPH). The experiments were conducted in both T. Aman and Boro seasons. In the T. Aman season, 18 crosses Forward breeding, 7 crosses for Pre-Breeding, 2 F_1 and BC_1F_2 crosses for Line Augmentation were made for BPH, GM resistance, high yield, acceptable grain quality, and 27 crosses were confirmed as true hybrids using quality check (QC) genotyping with purity SNP panel. In total 25,149 segregating progenies from 109 crosses of F_2-F_5 generations were advanced through Field Rapid Generation Advanced (FRGA) technique. Out of 2886 LST $F_{5:6}$ LST lines derived from 18 different crosses, 387 genotypes were selected based on strong plant architecture, grain type and uniformity in heading under field condition as well as the presence of the favorable alleles of key target genes for BPH (*bph9, bph17_1, bph17_2, bph17_3 and bph32*), Gm (*Gm4_3 and Gm4_4*) and grain quality *(Wx-A and Wx-10)*. The yield trials (OYT, PYT and AYT) were conducted at three locations of BRRI Gazipur, Cumilla and Rangpur. Eighty-one genotypes were selected from 276 breeding lines in OYT. Two selected OYT genotypes had both *bph17* and *bph32,* one genotype had both *bph17 with Gm4, and* one had *bph17, bph32* with *Gm4* SNP favorable alleles. Fourteen genotypes were selected from 49 genotypes in PYT. Eleven genotypes were selected from 36 lines in AYT. Total 65 parental lines were maintained in insect resistant maintenance breeding program.	BPH and Gall midge resistant variety will be developed with better yield potential (5.5-6.5 t/ha for T. Aman and 7.0-8.0 t/ha for irrigated Boro season).
1.11	**Development of Disease Resistant Rice (DRR)** Efforts were made for developing varieties resistant to bacterial blight (BB), rice tungro virus (RTV) and blast diseases. The experiments were conducted in both T. Aman and Boro seasons. Total thirty crosses for BB blast were made in T. Aman season using 40 parents. thirty crosses for BB and blast were confirmed as true F_1 in T. Aman season. A total of 72,300 progenies for BB and blast were advanced from F_{2-6} generation through Green-house RGA and FRGA. Out of 5000 lines, 384 lines were selected from LST in T. Aman season based on uniformity in heading, plant height and grain type. Twenty genotypes out of 98 genotypes for BB were selected from	BB, Blast and RTV resistant varieties will be developed with better yield potential (5.5 – 6.0 t/ha for T. Aman season and 7.5-8.0 t/ha for Boro season).

	observational yield trial (OYT) in T. Aman season showed better yield potential and agronomic performance over the check varieties and tolerance to BB. From AYT, four advanced lines out of 12 lines were promoted based on growth duration, grain yield and BB score compared to the check varieties in T. Aman season. From RYT, two genotypes for T. Aman season were selected compared to yield, growth duration, BB resistance and better grain quality characters and three BB resistant genotypes performed better. 96 advanced lines and germplasm were grown and maintained under maintenance breeding program.	
1.12	**Development of Submergence and Water Stagnation Tolerant Rice varieties** The project aims for the development of high yielding rice varieties tolerant to submergence (flash flooding) and medium stagnant water (MSW) stresses. Totally 44 single crosses were made and 37 single crosses were confirmed as true F_1's with 2800 F1 seeds through QC SNP panel analysis. A total of 17376 progenies from 78 crosses (4,524 from 10 F_2 crosses, 6,472 from 34 F_3, 2,152 from 27 F_4 progenies, 4,796 from 22 F_5 progenies) were harvested at the time of maturity, processed with proper labels and preserved. The ranges of mortality percentage of different RGA generations were around 7%. From LST population, 2287 lines from 13 crosses were genotyped with trait markers using custom SNP panel among which 245 lines were selected based on uniformity and traits markers like *Sub1, Wx-A group, Wx-A_NB, xa13, Xa21* etc. In yield trial, a total of 637 genotypes were tested out of which 147 genotypes were selected based on phenotypic acceptance, growth duration, survivability and higher yield performance. All the yield trial was conducted in Control condition (Sub Tank BRRI R/S, Rangpur), Hotspot condition (Jattrapur, Kurigram; Kodalkhata, Lalmonirhat; Kamarjani, Gaibandha; Domdoma, Rangpur; Dewanganj, Jamalpur) Non-stress/Rainfed condition (Boiragiganj, Rangpur and BRRI-HQ, Gazipur). 110 genotypes out of 316 genotypes were selected from OYT based on survivability, growth duration, phenotypic acceptance grain quality and yield advantages than check variety. Two PYT trial (PYT-1 & PYT-2) was conducted during the reporting period. Whereas 28 advanced lines were selected out of 59 breeding lines base on target product profile. 64 advanced breeding lines under three AYT trial (AYT-Early, AYT-Late and AYT-Special) were conducted in control, hotspot and rainfed condition. 39 lines were selected among the tested lines in AYT. 2 breeding lines were selected for ALART from PVS trail based on farmer's preference, growth duration and grain yield. One line (IR16F1148) was evaluated in PVT for submergence and stagnant flooding rice ecosystem, where the line performed better (20.50% yield advantage over the check variety BINA dhan11). Another line (BR9158-19-9-	High yielding rice varieties with different growth duration and three weeks submergence, stagnant flood and anaerobic germination tolerances with yield target 6.0-6.5 t/ha in normal condition and 5.5 t/ha in stress condition.

	6-50-2-HR1) was evaluated in PVT suitable for tidal submergence-prone ecosystem of Bangladesh, where the line performed better (21.00% yield advantage over the check variety BRRI dhan44). The heritability obtained for grain yield under stress of all trials conducted was ranging from 44 % to 95%, whereas that for non-stress trials was ranging from 38 % to 83%, indicating acceptable level of precision in these experiments. Through maintenance breeding, a total of 190 genotypes including submergence tolerance land races landraces were grown as panicle to row method to be maintained as nucleus stock for future use.	
1.14	**Development of Drought Tolerant Rice (DTR)** The project aims to develop of high yielding drought tolerant rice varieties under rainfed lowland rice ecosystem in the T. Aman season. In T. Aman 2023-24, a total of 3,908 F_1 seeds were obtained from 25 crosses using 25 parents and 25 crosses were confirmed as true hybrids using 10-SNP *indica* QC panel. A total of 9,314 individual progenies from 33 crosses from F_3 and F_5 generation were harvested through RGA. The materials were advanced in the Boro 2023-24 season and 4,930 progenies of 14 crosses from F_4 generations were harvested through RGA method. A total of 292 genotypes were evaluated in two OYTs in Gazipur, Rajshahi and Rangpur. Among the tested genotypes 43 genotypes were selected and forwarded in Advanced Yield Trial (AYT). In AYT, 67 genotypes were evaluated in two trials in Gazipur, Rajshahi and Rangpur and 12 genotypes were found promising and advanced in RYT. During flowering stage drought stress was observed in Rajshahi with moderate drought at Gazipur locations of OYT and AYT. In Rangpur there was not much drought observed. One genotype was forwarded fron RYT to ALART due to its grain yield and drought tolerance ability. Genetic trend of the genotypes from 2019 to 2023 showed the pBLUP (grain yield) in respect of trial year an annual 94.49 kg/ha equivalent to about 2.43% increase in grain yield per year based on yield of 2019.	Drought Tolerant Varieties for T. Aman season will be developed with potential yield target (5.0 – 6.0 t/ha).
1.15	**Deployment and Validation of High Beta-carotene Rice and High-Iron & Zinc Rice Varieties (Healthier Rice Project)** The main objective of the project was to develop high yielding transgenic rice varieties with enhanced provitamin-A, iron and zinc content in polished rice grain. A total of 658 BC3F2 seeds were obtained from two backcrosses. However, in two backcrosses (BRRI dhan71 and BRRI dhan89) six fixed lines (B type) and one hemizygous plant (H type) was identified in T. Aman 2023-24 season with a view to developing high iron and zinc enriched rice (HIZR). With a view to developing provitamin-A enriched rice, 176 fixed lines were selected from the 567	Development of high yielding rice varieties with enhanced Provitamin A, high Iron and Zinc content in polished rice grain.

	homozygous plants (B type) for Contained Trial (CT) in next T. Aman season.	
	Biotechnology Division	
	Program Area: Varietal Development program (VDP)	
	PROJECT I: DEVELOPMENT OF DOUBLED HAPLOID RICE VARIETY THROUGH ANTHER CULTURE	
1.1	Development of intermediate amylose content glycemic index (GI) rice variety through anther culture. During T Aman23, three doubled haploid lines derived from a cross between BRRI dhan29 and Kanaklata were grown in a SYT.	During T Aman, one lines were selected for ALART
1.2	Development of premium quality rice variety through anther culture Thirty-three (33) double haploid plants of BRRI dhan90/Kataribhog (Dinajpur) were evaluated in T. Aman 2023. Eight (08) double haploid Plants from BRRI dhan38/Bashful (Acc. No. 3954) were evaluated in T. Aman 2023.	Among them 65 plants were selected for generation advancement. Among them 48 plants were selected for generation advancement.
1.3	Development of Aus variety through anther culture Two crosses ware made for future anther culture program.	132 F_1 seeds from the cross BRRI dhan48/BR(Bio)9786-BC2-124-1-1 and 124 seeds from BRRI dhan98/ BR(Bio)9786-BC2-49-1-2 were produced.
1.4	Developmnt of antioxidant enriched black rice variety through anther culture During Boro 2022-23 five advanced breeding lines were evaluated at nine regional stations	Three lines were selected for ALART.
1.5	Preliminary yield trial (PYT) of antioxidant enriched black rice lines During T Aman22, seven doubled haploid lines derived from a cross between BRRI dhan28 and Padi Kool were grown in a SYT. During T Aman22, seven doubled haploid lines derived from a cross between BRRI dhan28 and Padi Kool were grown in a PYT. During Boro 2022-23, a total of 13 double haploid were evaluated as PYT	None was selected None was selected Among them six lines were selected

		depending on the growth duration, yield performance and grain color for further evaluation
1.6	Observational yield trial (OT) of the advanced lines In the Aus 2022-23 season, 44 anther culture derived lines were grown in an OT with standard checks	Twenty-three doubled haploid lines were selected for the preliminary yield trial based on phenotypic acceptance, growth duration, and yield
1.7	Photosensitive rice variety development	
1.8.1	Progeny Selection Forty-eight (48) advanced lines having taller seedling capabilities were grown in Aman 2022	Sixty-four plants were selected for further evaluation
1.8.2	Observational yield trial (OT) of the advanced lines Twenty-five (25) advanced lines were grown	Six (6) lines were selected for further evaluation
1.8.3	Observational yield trial (OT) of the advanced lines Thirty-five (35) advanced lines were grown in an observation yield trial (OT) in Aman 2022	Twenty (20) promising advanced lines were selected for further evaluation based on phenotypic acceptance, growth duration, and yield.
2.0	Development of high-yielding Boro rice variety	
2.1	Hybridization for the favorable ecosystem of Boro Rice using anther culture techniques In the Boro 2022-23, six crosses were made using nine parents	A total of season 513 F_1 seeds were produced from the five crosses
2.2	Progeny selection 160 Anther cultured derived lines from the cross combination of BRRI dhan48/BR(Bio)9786-BC2-49-1-2 and 90 lines from BRRI dhan86/BR(Bio)9786-BC2-49-1-2 were grown	150 plants were selected from the cross combination of BRRI dhan48/BR(Bio)9786-BC2-49-1-2{BR(Bio)15086} and 50 from the BRRI dhan86/BR(Bio)9786-BC2-49-1-2 {BR(Bio)15085}. Twenty (20) homozygous lines from the cross combination of BRRI dhan48/BR(Bio)9786-BC2-49-1-2 and 15 lines from BRRI dhan86/BR(Bio)9786-BC2-49-1-2 were

		selected
2.3	Preliminary yield trial (PYT) of the advanced lines Twenty five (25) short-duration advanced lines were grown in a preliminary yield trial (PYT-1) and 16 long-duration advanced lines were grown in a preliminary yield trial (PYT-2) in Boro 2022-23	Twenty (20) lines were selected from PYT-1 and 13 from PYT-2 for further evaluation based on phenotypic acceptance, growth duration, and yield.
	PROJECT II: DEVELOPMENT OF RICE VARIETY THROUGH SOMACLONAL VARIATION	
2.1.2	Observational yield trial (OT) of somaclonal variants in T Aman During T Aman 2023, 46 somaclonal varients were evaluated as OT for the development of antioxidant enriched black rice.	Among them two lines were selected depending on the growth duration, yield and grain color further evaluation
2.1.4	Development of premium quality (Kalijira type) variety through somaclonal variation Three hundred and twenty six (326) somaclonal variants (SCV$_3$) of Kalijira rice were grown in T Aman 2023	441 plants were harvested for further evaluation.
2.1.5	Development of premium quality rice variety through somaclonal variation Seeds of Kataribhog, Tulshimala, Radhunipagol & Shakkhorkhana (Local varieties) were used in this experiment. Seed culture was done to create somaclonal variations during T. Aman 2022	In a total 57 plants from Kataribhog (13), Tulshimala (02), Radhunipagol (23) and Shakkhorkhana (19) were regenerated after seed culture. Seeds were harvested from these plants for further evaluation
	PROJECT III: DEVELOPMENT OF RICE VARIETY THROUGH WIDE HYBRIDIZATION	
3-1	High yielding rice variety through wide hybridization followed by embryo rescue	
3.1.1	Progeny selection In a total 29 plants from BRRI dhan28/*O. glaberrima* (IRGC105190), BRRI dhan87/*O. glaberrima* (IRGC105190) and BRRI dhan48/*O. glaberrima* (IRGC105190) were evaluated in Boro 2022-23	Among them 44 plants were selected for generation advancement.
	Thirty (30) plants from backcross progeny of different wide-cross were evaluated in Boro 2022-23.	Among them 11 plants were selected for generation advancement
3.1.2	Preliminary (PYT) of lines derived from BRRI dhan28/*O. nivara* (IRGC103821) in Boro 2022-23	3 lines were selected depending on the

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	Five (5) lines derived from wide cross of BRRI dhan28/*O. nivara* (IRGC103821) were evaluated as PYT along with check BRRI dhan96 in Boro 2022-23	duration and yield compare with checks for further evaluation as SYT
	Progeny Selection Five embryos rescued BC$_2$F$_2$ populations were grown in T. Aman 2023	A total of 276 plants (Table 16) were selected from five populations.
	PROJECT IV: MOLECULAR MARKER ASSISTED SELECTION	
4.1	Marker assisted selection for fragrance in F$_5$ Population of BRRI dhan87 and Kalijira One hundred and eighty one (181) pedigree lines developed from a cross between BRRI dhan87 and Kalijira were evaluated as pedigree during T. Aman 2023.	Among them 154 plants were selected on the basis of aroma, growth duration and plant height
4.2	Marker assisted selection for aromatic and submergence tolerance rice genotype Population from BRRI Dhan90/Kalijira// BRRI Dhan52/Kalijira And BRRI Dhan90//BRRI Dhan52/Kalijira were grown as pedigree.	Aromatic progenies were Identified with Functional Marker of *BADH2* gene from two crosses
4.3	Development of multiple disease resistant (blast and bacterial blight) rice varieties using marker assisted selection Population from four crosses were grown as pedigree.	BB resistance gene were confirmed with gene specific primer Xa21, xa13
4.4	Association mapping for rice photosensitivity An association mapping panel of 159 was raised in two replications in short-day and long day conditions.	Heading dates were scored for each.
	PROJECT V: RICE GENETIC ENGINEERING	
5.1	Development of salt tolerant transgenic rice with *GlyI and GlyII* Rice genotype BRRI dhan29 was used as plant material and salt tolerant genes *GlyI (Glyoxalase I)* and *GlyII (GlyoxalaseII)* were used to make the rice variety salt tolerant through *Agrobacterium*-mediated transformation method. BRRI dhan29 was transformed with salt tolerant genes *(GlyI and GlyII)*. T$_5$ progenies were grown in the transgenic greenhouse following standard agronomic management practices in the cultivation period.	After transformation with *GlyI and GlyII* genes, plants were confirmed by *GlyI* and *GlyII* primers and sequencing. T$_5$ progenies were grown in the transgenic green house and seeds of homozygous line were collected for further molecular study.
5.2	Introgression of salt tolerant mangrove gene Transgenic plant containing mangrove salt tolerant gene, *AeMDHAR* was crossed with BRRI dhan28 and BRRI dhan92 for the introgression of salt tolerant gene *AeMDHAR*.	Three BC$_2$F$_3$ plants of BRRI dhan28 were harvested for further evaluation. Eighty one F$_1$ seed were harvested from

		the cross between BRRI dhan92 and *AeMDHAR* salt tolerant gene (from mangrove plant) containing transgenic plant.
5.3	Development of high yielding aromatic rice lines through genome editing For deactivate of function of *BADH2* gene, two primer were designed for construct preparation. Vector pRGEB31 was used in this experiment.	DNA was extracted from the vector pRGEB31. Both primer and vector DNA were digested with *BsaI* and ligated for construct preparation and confirmed by PCR followed by transformation into *Agrobacterium*
	PROJECT VI: C4 RICE DEVELOPMENT	
6.1	Identification of major regulators for C4 rice Total number of 7000 M4 lines Kaoun (*Setaria italica*) have been developed for further study. These lines are being raised for screening out plants losing C4 properties. For this the plants will be subjected to CO_2 stress in low concentration (20 ppm) CO_2 chamber for 72 hours and high-throughput screened for loss of C4 functions.	So far, 291 M4 lines have been screened and three among them is seemed to have lost C4 properties. This line is being maintained very carefully for further study
	PROJECT VII: DEVELOPMENT OF RICE VARIETY THROUGH MUTATION BREEDING	
7.1	High yielding T Aman, Boro and Aus rice varieties	
7.1.1	Observational yield trial (OT) of mutant BRRI dhan48 in Aus season During Aus 2022, 20 fixed lines of EMS treated variants of BRRI dhan48 were grown as OT with check variety BRRI dhan48	Seven lines were selected for further evaluation.
7.1.2	Progeny selection of mutant BR11 During T. Aman 2022 a total of 200 EMS treated mutant line of BR11 was evaluated as pedigree with standard check	Among them 200 plants were selected for further evaluation
7.1.3	Observational yield trial (OT) of mutant BR11 in Boro season During Boro 2022-23, 50 fixed mutant of BR11 were evaluated as OT with check variety BRRI dhan74, BRRI dhan89, BRRI dhan92 and BRRI dhan96.	Twelve (12) lines were selected for further evaluation
7.2	Development of variants using NMU of BRH-11-9-11-4-5B having reduced sterility Thirty one lines (M_3) of BRH-11-9-11-4-5B along with check variety were transplanted in Boro 2022-23.	Hundred (100) plants were selected for further evaluation.

7.3	Development of Kilijira type rice variety through mutation Seed from 91 M_3 Kilizira lines were transplanted in T Aman 2022 with optimum management.	Ninety One (91) M_2 Kilijira lines were transplanted in T Aman 2022 along with check and 168 plants were selected based on aroma and plant height for further evaluation.
7.4	Development of Premium Quality Rice through Mutation by EMS Thirty-six (36) Kataribhog plants (M_2) and twenty-nine (29) Tulshimala plants (M_2) were evaluated during T. Aman 2022. Pedigree selections were done with desirable traits	Six (06) Kataribhog (M_3) plants and thirty one (31) Tulshimala (M_3) plants were selected for generation advancement.
7.5	Development of High Yielding Sheath Blight Resistant Rice Variety During T. Aman 2022, 22 mutant population of BRRI dhan87 were grown for evaluation	In T. Aman 2022, 60 plants from M3 generation were selected for further evaluation.
7.6	Development of premium quality rice variety Seed from 7 rice genotype was treated with 350Gy and 450Gy Gamma radiation and transplanted in 2023.	A total 50 and 41 M_3 plants from 350Gy and 450Gy were harvested respectively for further evaluation
	PROJECT VIII: BASIC RESEARCH	
8.1	Study on Kernel Elongation of Rice Sixty-four selected genotypes were grown in T Aman, 22 to make genetic purity	Seed were harvested from single plant to make genetic purity. These pure seeds were grown in net house and purified seed from single hill were harvested for further analysis.
	Hybrid Rice Division	
	Program Area: Varietal Development program (VDP)	
	Program Area: Varietal Development **Project: Material development, seed production and its distribution** **Research Progress of 2023-2024**	
01.	Seven new CMS (A) lines (BRRI13A/3145B, BRRI97A/3089B, BRRI97A/205B-20-9, BRRI99A/3137B, BRRI99A/208B-6-8, BRRI99A/217B-20-3 & BRRI99A217B-26-6) as	Newly developed seven CMS lines will be used for new hybrid rice variety

	BRRI159A, BRRI161A, BRRI162A, BRRI163A, BRRI164A, BRRI165A & BRRI166A having diverse characters were developed.	development for T Aman & Boro seasons.
02.	CMS multiplication and seed production package development of promising CMS lines and hybrid combinations has been initiated	After study of commercial seed production feasibility, the selected combination will submit to Seed Certification Agency (SCA) for variety release purposes.
03.	A total of 19407 kg of F_1 seeds of BRRI hybrid dhan2, BRRI hybrid dhan3, BRRI hybrid dhan5, BRRI hybrid dhan7 and BRRI hybrid dhan8 were distributed through different regional stations of BRRI and department of agricultural extension	Popularization of BRRI released hybrid varieties.
04.	Seed production program of BRRI hybrid dhan2, BRRI hybrid dhan3, BRRI hybrid dhan4, BRRI hybrid dhan5, BRRI hybrid dhan6, BRRI hybrid dhan7 and BRRI hybrid dhan8 was initiated at farmers level under Mymensingh, Gopalganj, Kurigram, Sherpur, Ishwardi, Lalmonirhat and Sonagazi district	Farmers could able to produce own F_1 seeds of BRRI released hybrid rice varieties and in such a way small entrepreneurship will be developed at farmers level.
	Genetic Resources and Seed Division	
	Program Area: Varietal Development program (VDP)	
1.0	**Project: Genetic Resources conservation and management** • Collection of 454 germplasm. • Rejuvenation of 2747 germplasm and characterization of 166 germplasm with 53 morpho-agronomic characters. • Supply of 1137 accessions of germplasm of which 378 samples of BRRI varieties for research and demonstration. • 138 germplasm was registered as genebank accession. • 1541 rice accessions were purified morphologically in the field during T. Aman 2023	Long term conservation of the rice germplasm and utilization for future research and breeding. Findings of the experiments according to objective could be utilized in further research.
2.0	**Project: Seed production and variety maintenance** • All BRRI developed and few recommended varieties (125) were maintained as nucleus stock. • During Boro season, 193.65 tons Breeder seed from 24 varieties, 15.0 tons of seven varieties in Aus and 81.7 tons from 35 varieties in T. Aman seasons were produced.	Maintenance of pure seed stock and supply of Breeder seed to GO, NGO and private seed producing organizations according to their demand under rice seed network of

	• Again, 159.0 tons Breeder seed from 24 varieties in Boro and 11.7 tons from seven varieties in Aus seasons were distributed.	BRRI.
3.0	**Project: Exploratory and genetic studies**	
	Evaluation of photosensitive rice germplasm collected from Northern districts of Bangladesh	Rosul Bhog (Acc #338), Joysail (Acc #5969) and, Ganjia (Acc #287) showed relatively better performance than other accessions
	Selection of superior genotypes from T. Aman/ Boro rice germplasm based on agro-morphological traits	The accessions having higher yield and other desirable characters could be utilized in the crossing program.
	Characterization of Similar/duplicate named Jhoshua, Malshira, Shailla and Shapahar groups of germplasm	Twenty-six Jhoshua, Mal shira, Shailla and Shapahar rice germplasm of T. Aman was morphologically characterized using 53 morpho-agronomic characters of BRRI rice descriptor
	Molecular characterization for purification and duplicate sorting of genebank accessions	GBS profiles of 382 germplasm accessions are available now. Based on sequence homology (>97.5%) genetically identical plants have been selected for seed multiplication for downstream analysis.
	Identification and selection of Sticky rice from Jhum rice germplasm	A total of 22 Jhum rice germplasm were found to have amylose content below 9%.
	DNA finger printing of Biruin rice germplasm	Forty-eight Biruin accessions in T. Aman'2023 season were studied using 40 SSR markers.
	Agronomic performance and trait-based phenotyping of Aus germplasm	Four germplasm showed moderately tolerant reaction to BPH and one germplasm showed resistant reaction to

		BLB.
	Evaluation of agronomic performance of Aus rice germplasm collected from greater Kushtia region of Bangladesh	A total of 67 Aus rice germplasm collected from greater Kushtia region (Kushtia, Chuadanga and Meherpur) were characterized at morphological level using 'Rice Descriptors.
	Assessment of agronomic performance and physico–chemical properties of red rice germplasm of Bangladesh	A total of 50 red rice germplasm was characterized through DUS test descriptors.
4.0	**Project: Miscellaneous Activities**	
	Rice germplasm supply and exchange	A total of 3,007 samples were supplied to 21 different users.
	Sending khudebarta (SMS) for Breeder Seed Distribution	Text message (SMS) with variety name, allotted quantity of breeder seed, date of BS collection from GRS Division, amount of money need to be deposited and bank account number were sent through mobile apps to 433 partners before Boro 2023-24 for distributing breeder seed through BRRI 'Rice Seed Network'.
	Monitoring of BS and FS production farms	The breeder seed production farm and storage of nine BRRI regional stations and FS production farm of BADC at Dattanagar have been visited.
	Grain Quality and Nutrition Division	
	Program Area: Varietal Development program (VDP)	
	Grain Quality Characteristics for Varietal Development	
	1.1: Determination of physicochemical and cooking properties of advanced breeding lines	A total of 337 samples were analyzed.
	1.2: Determination of physicochemical and cooking properties of transforming rice breeding lines	A total of 4117 samples were analyzed.

	1.3: Evaluation of physicochemical properties of newly released BRRI varieties	BRRI website were updated all physicochemical and cooking data upto Bangabandhu dhan100 (BRRI dhan100) with BRRI Hybrid dhan6.
	1.4. Determination of physicochemical and cooking properties of rice samples collected from farmers field	A total of 60 rice samples collected from farmers field of Bogura and Naogaon and analyzed.
	Nutritional Quality Assessment of Rice	
	2.1: Anthocyanin content, antioxidant properties and expression of anthocyanin biosynthetic pathway genes in pigmented traditional Boro rice cultivars of Bangladesh	A total of 09 samples namely ACC 253 Boro, 149 Mi- Pajang, 260 Kali Boro, 258 Tepi boro, 179 Bhaturi, 180 Dhali Boro, 254 Ausha Boro, 178 Cunail, 182 Ghugu Boro were collected and analyzed.
	2.2: Antiproliferative activity analysis of black rice extract in the cancer cell line	Black rice cultivars Bk-9 (from Sylhet), Bk-10 (from Khagrachori), and Bk-11 (from Bandarban) exhibited antiproliferative activity on the HeLa cell line. White and red rice extract did not exhibit any cytotoxic effects on malignant HeLa and non-cancerous Vero cell lines. Black rice extracts did not exhibit any cytotoxic impact on the non-cancerous Vero cell line. Consequently, these data indicate that black rice bran extracts can be considered safe for consumption in food, as they did not show any harmful effects on Vero cells, which are non-cancerous cells.

	2.3: Assessment of heavy metals (Cd, Zn, Pb, Cr, As) in soil, water, and rice grain from industrial area (Dhaka, Gazipur, Narayangonj, Mymensingh, Narshindi etc.)	Cd content in soil, root, and straw from industrial area of Gazipur (2021-22 & 2022-23) were collected and analyzed.
	2.4: Nutraceutical characterization of newly released BRRI HYVs.	A total of four BRRI varieties namely BRRI dhan80, 84,87,89 were analyzed for Antioxidant, Vitamin, Mineral, Fatty Acid and Amino Acid Profiling.
	Commercial Rice Based Products	
	3.1: Determination of physicochemical properties and nutritional quality of puffed, popped and flattened rice from newly released BRRI varieties	A total of ten BRRI Varieties namely BR11, BR23, BRRI dhan28, BRRI dhan32, BRRI dhan51, BRRI dhan52, BRRI dhan55, BRRI dhan58, BRRI dhan60, BRRI dhan67 were analyzed for Physical Properties of popped rice.
	3.2 Formulation of rice-based foods supplemented with anthocyanin-enriched fermented rice bran	1. A total of 20 rice cultivars including both pigmented and non-pigmented were characterized for physicochemical, cooking, nutraceutical properties. 2. a total of five rice cultivars including three black rice, one red rice and one white rice were selected and send to GIFS, Canada for whole genome sequencing. 3. Formulation of anthocyanin-fortified rice-based bakery products with fermented rice bran.
	Rice Farming Systems Division	
	Program Area: Rice Farming Systems	
	1.0 Survey	

1.1	Characterization of farming system of Charlands The survey was conducted in Char Gadai, Kaunia, Ranpur and Myzgari Char in Kazipur, Sirajganj. However, surveys in Subornochor will be conducted soon	Maize and Ground nut were the major crops in char land. Late Aman Gainja is very popular in Myizgari char at Sirajganj.
	2.0 Development of Cropping System and Component Technology for Favorable Environment	
2.1	Performance evaluation of four-crop cropping pattern for irrigated medium high land ecosystem Trial has been established in Kharif-1 and Kharif-1 and Rabi season.	Yield of T. Jute was 0.85 t/ha and T. Aus was 4.01 to 5.44 t/ha and in case of T. Aman, it was 2.65 to 5.65 t/ha under different cropping patterns. In Rabi season, yield of Tomato was 9.58 t/ha, Mustard was 1.23 to 1.72 t/ha, Potato was 14.30 to 20.01 t/ha. Other crops are in the field.
2.2	Performance evaluation of three-crop cropping pattern for irrigated medium high land ecosystem Trial has beeen established in Kharif-1 and Kharif-1 and Rabi season.	Yield of Jute was 1.05 t/ha. T. Aus was 4.22 to 5.06 t/ha and in case of T. Aman it was 2.50 to 5.07 t/ha under different cropping patterns. In Rabi season, yield of Mustard, Potato, Wheat, Sunflower, Onion was 1.77, 11.86, 3.74, 1.54, 20.55 t/ha, Lentil was damaged due to heavy rainfall. Other crops are in the field.
2.3	Effect of fertilizer management of Boro rice in late situation under Potato -Boro -T. Aman cropping system Trial has beeen established in Kharif-1 and Kharif-1 and Rabi season. Boro rice in the field.	Mustard (BARI Sorisha14) was harvested on 24 November, 2023 and yield was 2.1 t/ha.
2.4	Determination of optimum planting window of newly released rice varieties in Mustard-Boro-T. Aman cropping system Trial has beeen established in Kharif-1 and Kharif-1 and Rabi season.	BRRI dhan71 and 87 turned out higher grain yield when transplanted from 10 July to 29 August compared to BRRI dhan49 and 75. However, BRRI dhan87 performed better than other

		tested varieties when transplanted at 29 August. BARI Sarisha-14 gave higher grain yield when sown at 08 November. After that time the grain yield decreased with the progress of time and the decreasing rate is higher after 15 November sowing. Boro is in the field.
2.5	Exploration of water logged wetland ecosystem through the development of *Sorjan* system for integrated fish, vegetable and fruit production Sorjan system for integrated fish, vegetable and fruit production has been established	Higher productivity is found in the sorjan system
2.6	Transformation of waterlogged wetland into three-tier system for integrated rice-fish, vegetables and fruit production In T. Aman season BR22 yielded 4.26 t ha-1 grain yield which was significantly higher than BRRI dhan30 (3.77 t ha-1). The rice-fish system produced 20.41 kg of different fish species on 3.20 decimal acres of land. Different types of summer vegetables are established in the dyke	Total system productivity is achieved in this model
2.7	Evaluation of newly released BRRI rice varieties under Boro -Fallow-T. Aman cropping pattern BRRI dhan89 and BRRI dhan92 were evaluated in Boro and BRRI dhan103 were evaluated in Aman season.	All the varieties gave more than 7.0 t/ha yield
	1.0 **Development of Cropping System and Component Technology for Stress Prone Area**	
3.1	Intensification of Watermelon-Fallow-T. Aman cropping pattern by inclusion of Aus rice The experiment was established in Dacope, Khulna.	Mean yield of T. Aus was 5.9 t/ha and T. Aman was 4.2 to 4.3 t/ha. Watermelon data is under processing
3.2	Improvement of Boro-Fallow-T. Aman cropping pattern with BRRI newly released rice varieties The experient was eatablised with newly released BRRI varietes	Mean yield of BR23 was 4.39 t/ha and BRRI dhan87 was 4.43 t/ha where local was 2.10 t/ha. Boro is in the field

3.3	Management of aged seedling to minimize the yield loss of T. Aman rice The experiment was established in BRRI, Gazipur	The yield performance of aged seedling of BRRI dhan71 with fertilizer management was higher than 20-day-old seedling of BRRI dhan71.
	4. Development of Cropping System Technologies for Hill Ecosystem	
4.1	Exploring the hills for rice research: Feasibility study for exploring spring water for Boro cultivation BRRI dhan89 performed better in plain land of the valley of hilly areas	Boro rice can cultivate in hill valley using spring water
4.2	Exploring the hills for rice research: Feasibility of Boro rice cultivation in fringe land at Rangamati district BRRI dhan89 performed better in plain land of the valley of hilly areas	Fringe land is one of the potential area for Boro rice cultivation using surrounding available water resources
4.3	Improvement of Jhum production system through the introduction of modern HYV Aus varieties in hilly areas BRRI dhan83 performed better in hilly areas	BRRI developed HYV Aus rice can increased the rice yield in jhum cultivation system
4.4	Fertilizer management in HYV Aus rice in Jhum cultivation system Fertilizer management in ring placement could increase the yield level of HYV Aus rice in jhum cultivation	Fertilizer management is one of the options to increase yield of HYV Aus rice in jhum cultivation system
	5. Validation and Delivery of Cropping System Technology	
5.1	**Utilization of fallow land to intensify the single T. Aman area and boost up the productivity in the Sylhet region** In T. Aus season BRRI dhan98 yielded 5.84-5.67 t ha^{-1} grain yield. In T. Aman season BRRI dhan87 produced 5.28 t ha^{-1} grain yield followed by BRRI dhan103 (4.83 t ha-1). BRRI dhan75 gave statistically lowest grain yield (4.34 t ha-1), which was statistically similar with BRRI dhan71 (4.48 t ha-1).	Fallow-BRRI dhan98-BRRI dhan87 produced 11.03 t ha-1 grain yield, which yielded 136% higher grain yield than the traditional Fallow-Fallow-BRRI dhan49 (4.67 t ha-1) cropping pattern.
5.2.	**Increasing productivity of Boro-Fallow-T. Aman cropping pattern through inclusion of Mustard in Mymensingh region** In Aman season, BRRI dhan75, BRRI dhan95 and BRRI dhan103 were evaluated in Mustard based cropping patterns with check Boro-Fallow-BRRI dhan49 cropping pattern.	BRRI dhan103 gave significantly higher yield in Aman season. Mustard yielded ranged from 1.48 to 1.79 t/ha.
5.3	**On-farm trial on the effect of establishment methods and varieties on productivity, profitability and heat stress of late planted Boro rice in Potato-Rice-Rice cropping systems** The trial was establisehd in Nilphamari and Rangpur with transplanted and dry seeding method in	In Boro season, transplanting rice gave higher yield than dry seeded rice.

	Aman and Boro season. In both sited Dry seeded Aman rice plots were damaged.	
5.4	**Expt. 5.5. Cropping systems intensification through incorporation of diversified crops and fodder under Rice-Rice Cropping Systems** Improved CS: T. Aman – Mustard/Field pea/Alfalfa – Boro pattern were evaluated with Aman – Fallow – Boro Variety: Boro: BRRI dhan50, BRRI dhan63, BRRI dhan84; T. Aman: BRRI dhan71, BRRI dhan75	In Aman season, BRRI dhan71 gave significantly higher yield than BRRI dhan75.
5.6	**Expt. 5.6 Performance of nano-urea on reduction of overall N fertilizer and farmers' production cost in rice-rice cropping pattern** The experiment with nano urea with different combinations of fertilzer were evaluated in Gazipur, Rangpur and Kustia.	The data yet not analized
	6. Integrated Farming Systems	
6.1	Development of Integrated Farming Systems for Different Farm Categories for Improving the Livelihoods of the Resource Poor Farm Household Integrated Farming Systems activities were intervened in different farm ccategories	Livelihoods of the resource poor farm household in increased
6.2	Characterization of the farming systems research and development site A survey was completed in farming systems research and development site	There were more absentee farmers and some were engaged in business, rickshaw pulling etc.
6.3	Monitoring the whole farm activities of intervened farmers Farming system activities were intervened in eight farmers household	
6.4	Integration of mustard/Sunflower in the Boro-Fallow-T. Aman cropping pattern in irrigated ecosystem A trial was conducted in 16 farmers' fields at Kaliganj, Gazipur with the different cropping pattern combinations	In Aman season, BRRI dhan71 yielded on an average 5.49 t/ha which was 18% higher than that of BRRI dhan49. The yield of mustard and sunflower ranged from 1.18-1.59 t/ha and 2.45-3.84 t/ha, respectively. Boro is in the field.
6.5	Promotion of improved cropping pattern packages A trial was conducted in 30 farmers' fields at Kaliganj, Gazipur with the different cropping pattern combinations	BRRI dhan103 gave higher yield than other varieties in Aman season
6.6	Farmers' participatory evaluation of recently released BRRI varieties for Boro and T. Aman season BRRI dhan75, BRRI dhan87 and BRRI dhan103 were evaluated in Aman season. In Boro season,	The highest yield was found in BRRI dhan103. Boro data not yet analyzed.

	BRRI dhan89, BRRI dhan92, Bangabandhu dhan 100, BRRI dhan102, BRRI dhan104 and BRRI dhan 105 were evaluated	
6.7	Farmers' participatory quality seed production of recently released BRRI varieties for Boro and T. Aman season A total of 1178 seeds were distributed for seed production in Aman season with BRRI dhan71, BRRI dhan75, BRRI dhan87, BRRI dhan90 and BRRI dhan BRRI dhan103.	Each farmer kept 2-5% of their produced grain for seed purpose. They distributed 1-2% grain to the neighboring farmers. Most of the farmers sold major portion of their produced grain in market as non-seed. Boro data not yet analyzed.
	Agronomy Division	
	Program Area: Crop Soil Water Management	
	Planting Practices	
1	Effect of time of planting on the agronomic output of newly developed BRRI varieties in different eco-system	The optimum transplanting date of BRRI dhan75 and BRRI dhan87 to achieve maximum grain yield at Gazipur is 5th August.
2	Effect of time of planting on the agronomic output of newly developed BRRI varieties in different eco-system	On-going
3	Increasing productivity of Ratoon Rice	On-going
4	Investigation on Ratooning Ability of inbred and hybrid Rice	On-going
	Fertilizer Management	
5	Determination of optimum seedling age and N scheduling for yield maximization of BRRI hybrid dhan7	Both Gazipur and Kapasia 15 days old seedling achieved 5.93 and 6.39 t/ha yield with N scheduling of basal 1/3, Active tillering 1/3 and before PI 1/3 of 92 kg N/ha
6	Application of Nano-Zinc Oxide to Improve Salt Tolerance of Rice	Nano-Zinc Oxide accelerates germination of rice seed and improves plant growth at seedling stage
	Yield Maximization	

7	Effect of different yield goal levels agronomic factors-based managements on lodging behavior of BRRI developed T Aman varieties	Agronomic factor-based management on varietal lodging behavior at different yield goal level will be determined.
8	Effect of agronomic factors for maximizing yield (>5 t/ha) of BRRI developed Long Slender Premium Quality Fine Rice like Katarivog (BRRI dhan70) through developing sustainable production management protocol in T Aman season	Agronomic factor-based management for SLPQFR like BRRI dhan70 for obtaining maximum yield will be identified and recommended.
9	Maximizing yield of BRRI developed new varieties through influencing some Agronomic Critical Factors in T Aman seasons at BRRI farm Gazipur	Agronomic critical factor-based management for yield maximization of Aman varieties will be identified and recommended.
10	Effect of agronomic factors for maximizing yield (7 t/ha) of medium duration BRRI variety (BRRI dhan94) through developing sustainable production management protocol in T Aman season	Yield maximization management packages for BRRI dhan94 will be identified and recommendrd.
11	Effect of some agronomic factors for maximizing yield of long duration BRRI variety (BRRI dhan92) through developing sustainable production management protocol in Boro season	Yield maximization management package for BRRI dhan92 will be identified and recommendrd.
	Good agricultural practice	
12	Yield maximization of Boro rice through good agricultural practice (GAP)	GAPs management produced the highest grain yield in BRRI dhan89 (7.34 t ha^{-1}) followed by BRRI dhan88 and BRRI dhan50
	Soil Health Improvement	
13	Effect of herbicides on soil microbial community, soil fertility and enzyme activity	After the application of herbicide, the bacterial populations were sharply decreased at 3 Day after application and suatained up to 15 days after application. After the application of herbicide, the fungal populations were sharply decreased at 3 Day after application and suatained up to 10 days

		after application.
14	Screening and characterization of salt-tolerant PGPR (ST-PGPR) isolated from different saline soils in Bangladesh	Nine potential PGPR strains have been identified as salt-tolerant bacterial strains, significantly enhancing seedling growth during its inoculation to rice plants under salt-stress conditions.
	Weed Management	
15	Effect of adding urea with Herbicides for controlling weeds and the growth and yield of transplanted Rice	Bensulfuran methyl + Acetaclor @ 750 g/ha with 5 kg urea/33 decimal fb 1 HW performed best results which observed 7.02 t/ha yield.
16	Reduce weed seed in weed Seed Bank of soil in long-term fallow management and herbicide uses in Rice- rice Cropping System	• Herbicide treatment causes a slight reduction of weed seed (15-20% in deeper layers of weed seed bank • Tillage after flowering of weeds and control plots showed higher weed seed in weed seed
17	Evaluation of candidate herbicides for WCE of rice	A total of 12 groups of herbicide efficacy were evaluated from which Bispyribac sodium 40% SC, Pyraclonil 2% and Pretilachlor 15 %+ Oxyfluorfen 12 %+Oxadiazon 7 % were new molecule which also control more than 80% control of weeds.
	Soil Science Division	
	Program Area: Crop Soil Water Management	
	Project 1. Fertility Assessment of Rice Soils and Nutrient use efficiency in rice	
	Expt. 1.1 Updating of nitrogen doses for modern rice varieties The calculated economically optimum N dose for BRRI dhan95 in T. Aman 2023 season was 75 kg/ha.	The requirement of nitrogen for optimum yield of the latest varieties will be quantified.

	Expt. 1.2. Effect of nitrogen and potassium rates on modern rice cultivation 50 kg N and 50 kg K was sufficient to get optimum grain yield of BRRI hybrid dhan6 in T. Aman season	Suitable ratio of N and K for MV rice cultivation will be developed with N and K dynamics in soil and plant.
	Expt. 1.3. Fertilizer management for Tidal Submergence tolerant ALART material in T. Aman 2023 • The advanced lines BR9158-19-9-6-50-2-HR1 performed better than the check varieties BRRI dhan44 and BRRI dhan87 in the complete fertilization • The advanced line also performed better than the check varieties with the omission of N-P and K	Optimum doses of N-P-K for Tidal Submergence ALART materials will be developed
	Expt. 1.4. Phosphorus response study of newly released rice varieties -Response of added P is lower in wet season than in both dry and wet season -BRRI hybrid dhan3 performed better with 100% STB P (22 kg P) application in T. Aman 2023.	The requirement of phosphorus for optimum yield of the latest varieties will be quantified.
	Expt. 1.5. Efficacy of TSP and DAP Fertilizer in Wetland Rice • Response of TSP fertilizer is higher than DAP fertilizer for grain yield in both season • BRRI hybrid dhan3 and 6 yielded higher with 100% TSP application and also in 50%TSP+ 50% DAP application	The efficacy of TSP and DAP fertilizer in deficient soil P condition will be determined.
	Expt. 1.6. Screening of N use efficient rice genotypes types Considering grain yield trait, three QTL's association detected for N deposition in rice root. SNP position: Chromosome 1: 16.02 Mb, Chromosome 11: 17.85 Mb, Chromosome 12: 26.05 Mb	N use efficient rice genotypes will be developed.
	Project II: Identification and Management of Nutritional Disorders in Rice	
	Expt. 2.1. 1.ong-term effect of organic and inorganic nutrients in Boro-Fallow-T. Aman rice In case of annual yield, organic fertilizer with IPNS based chemical fertilizer as well as the complete chemical treatment showed increasing trend compared to native nutrient treatment	Increased yield and soil health maintenance through balanced fertilization
	Expt.2.2. Effect of intensive rice cropping on rice yield under continuous wetland condition Intensive rice cropping with complete fertilizer (NPKSZnCu) resulted in highest yield of rice compared to other fertilizer treatments	The consequences of intensive cropping under continuous wet land conditions will be evaluated.

	Expt. 2.3. Long-term missing element trial (BRRI R/S Rangpur) At BRRI Rangpur, N is the most yield limiting nutrient followed by P, K and S in both Boro and T. Aman season	Nutrient supplying capacity of Rangpur soil will be determined.
	Project III. Integrated nutrient management	
	Expt. 3.1. Integrated Nutrient Management for Double and Triple Rice Cropping for Maximizing Productivity Annual yield for double and triple rice cropping were 11 t/ha and 14 t/ha, respectively.	Rice yield improvement through nutrient management in the coastal area.
	Expt. 3.2. Estimation of C and N flows in a village and developing methods to improve soil C and N within the system There are variations for Total N input and output between the Farm size and it is higher in the Marginal Farm compared to Small Farm N foot print in wet season (Aman): 0.4 to 1.12 kg N eq/t N foot print in dry season (Boro): 0.4 to 1.05 kg N eq/t	Major C and N flows in a village will be quantified to improve soil C stock and NUE in the farming system
	Expt. 3.3. Best Management Practices to Increase Rice Productivity and Soil Health • Organic combinations using PM and CD with 25-50% reduced doses of chemical fertilizers can gave comparable and satisfactory yield • It can save significant amount of chemical fertilizers as well as minimize environmental pollution	Development of technologies for safe rice production, maintenance of soil health and minimize environmental pollution.
	Project IV. Soil and Environmental Problems	
	Expt.4.1. Effects of rice cultivars and fertilizer management on rice yield and greenhouse gas emissions • BRRI hybrid dhan6 significantly increased rice yield than other tested varieties (BRRI dhan75, BRRI dhan87, BRRI dhan90) • BRRI dhan75 significantly reduced CH_4 emissions by 10-15% emissions compared to other tested varieties.	A technology for increased crop productivity with reduced negative environmental impacts of GHG will be developed.
	Project V. Soil Microbiological studies	
	Expt.5.1. Bio-Coated Urea: a new approach to improve N fertilizer use efficiency (NUE) and crop yield	To formulate a bio-coated urea fertilizer with higher efficiency.

	Bio-Coated Urea at recommended N dose showed the similar grain yield compared to prilled urea. However, BCU @ 40% reduced dose yielded substantially higher grain than PU.	
	Evaluation of Bio-organic fertilizer for the improvement of rice yield at low chemical fertilizer 1 t/ha BOF produced higher grain yield with 100% saving of TSP and 30% reduced N dose.	The efficacy bio-organic fertilizer for growth and yield of rice will be evaluated.
	Irrigation and Water Management Division	
	Program Area: Crop Soil Water Management	
1	**Determination of Physical and Hydraulic Properties of Different Soil Types** *Progress:* • Twelve soil samples were collected from BRRI research field for Bulk density, Particle size analysis and Soil Water Retention Curve (SWRC) • Samples collected at 4 different depths from 3 locations • GPS of all soil sampling points recorded for Geo-referencing • Bulk density determination and Particle size analysis completed SWRC development is under processing	Documentation of important soil physical properties can help for implementing efficient water management and can contribute to data bank generation for crop modeling.
2	**Development of Automated Alternate Wetting and Drying Irrigation System for Rice Production** *Progress* • Four ultrasonic sensors based Automated AWD unit prototype has been developed and installed in the field • The system is running by rechargeable battery powered by solar energy and able to relay water level data to a sever to be stored • When water level goes 15 cm below surface, AWD unit send irrigation request to server and server starts the motor unit automatically When water level rise 5 cm above surface, AWD unit send "Stop pump" request to server and server stops the motor unit automatically	Development of precision irrigation system in ric cultivation that will save irrigation water and reduce fuel and labor cost
3	**Optimization of Water Use Efficiency Through Subirrigation in Bangladesh** *Progress:* • Subirrigation irrigation system installed at BRRI farm Gazipur • Subirrigation lateral spacing: 1.2 m, depth: 50 cm, area: 132 sq. m.	Increased water use efficiency and productivity

	• Water supply: 1000 L Overhead Tank with Gate valve • BRRI dhan89 transplanted as test variety Irrigation water volume and field water level is monitored daily	
4	**Increasing Land Productivity in Valley Area of Hilly Region Through Integrated Minor Irrigation System** *Progress:* • In total 12 hill stream (Chora) selected as irrigation water source • Water conserved by building earthen cross dam • Low lift pump (LLP) based minor irrigation system installed in 12 sites including improved distribution system, water saving technology and high yielding variety • About 300 bigha land brought under cultivation in Six upazilas of Chittagong Hill Tracts Crop status and irrigation water distribution regularly monitored	Suitable water management options has been identified for agriculture and livelihood improvement in the hilly area.
5	**Study on water stress tolerance for different advanced rice genotypes of BRRI** *Progess:* • Genotype materials were supplied from the Plant Breeding division • Five ALART materials and three check varieties were transplanted on 11/01/2024. • Two PVT materials and one check variety were transplanted on 11/01/2024 The crop is now at the Maturity stage	The outcomes of this study would provide information regarding scaling of water-stress tolerance capacity (WSTC) of each variety.
	Performance evaluation of the proposed rice varieties under different water regimes • Genotype materials were supplied from the Plant Breeding division • Five ALART materials and BRRI dhan104 (check variety) were transplanted on 16/01/2024. The crop is now at the Maturity stage	Suitable water management practice for the cultivers will be suggested.
6	**Assessment of Surface and Groundwater Quality for Irrigation in Selected Locations of Bangladesh** *Progress:* • The water samples were collected from different sources of ground water and surface water. • Collected samples were preserved refrigerator in laboratory for chemical analysis • The chemical analysis of the collected sample is ongoing	Safe irrigation water sources has been documented

7	**Feasibility of Mini-Sprinkler Irrigation System in Transplanted Rice in Bangladesh** *Progress:* • BRRI dhan89 has been established in the experimental field • The plants are in the maturity stage. After harvesting, analysis will be done	Increased water use efficiency and productivity
8	**Crop evapotranspiration, irrigation water requirement and yield response to delayed transplanting of Boro rice** *Progress:* • The experiment is established at BRRI farm Gazipur. • Treatments: four sowing dates with four replications. • Sowing dates: 15 January, 30 January, 14 February, 1 March. • Data collection related to crop phenology and water requirement is completed. • Crop is now maturity stage • After harvesting and collecting yield data, analysis will be done.	The possible outcomes of this study would be the identification of cutoff date for decreasing potential yield of transplanted Boro rice.
9	**Impact of saline water irrigation and rice straw and Gypsum amendment on soil physicochemical properties and rice yield in the coastal saline area** *Progress:* • Experiment is established at Batiaghata Upazilla in Khulna district on 20 January 2024 • Tested variety is BRRI dhan67 with four saline water irrigation treatments. • Treatments: I_1: 2 dS/m, I_2:4 dS/m, I_3: 6 dS/m, I_4: 8 dS/m • The data collectin on plot water salinity, soil salinity and crop phenological data is completed Crop yield reglated data collected is ongoing	Improved soil physiochemical properties and reduced salinity
10	**Validation of agricultural drought forecasting for mitigating drought in T. Aman rice at Rajshahi region** *Progress:* • Sufficient rainfall occurred during the T. Aman season 2023. • The reproductive and early of the ripening stages, there was insufficient rainfall occurred in Rajshahi. • A good matching was found between observed and forecasted rainfall. Observed and forecasted rainfall were 666 mm and 609 mm, respectively during its growth period from	Weather forecast based irrigation management overcome drought stress hence increased rice yield

	transplanting to harvesting Total observed and forecasted ET_0 were measured 371.64 mm and 390.62 mm, respectively. Details analysis of the experiment are under processing.	
11	**Irrigation Scheduling of Rice (*Oryza sativa* L.) Based on Weather Forecasting in Gazipur** *Progress:* • The experiment is being conducted at BRRI farm Gazipur during Boro 2023-24. • The test variety is BRRI dhan92. • The crop is now maturity stage After havrvesting and collected yield related data, the details analysis will be done	A better method of irrigation scheduling will be identified
12	**Performance Evaluation of Smart Card Operated Irrigation Management of Rice Field in Muhuri Project Areas of Feni District** *Progress:* • Experiment was conducted at Muhuri project in Sonagazi, Feni. • Four farmers plots were selected under categorize as traditional farmers practice, smart card operated field, both AWD and smart card operated field and only AWD operated field under one pump owner. • BRRI dhan74 was sown on 28/11/2023 and was transplanted on 04/01/2024 The yield related data collection is ongoing.	Irrigation water loss and irrigation cost will be minimized
	Plant Physiology Division	
	Program Area: Crop Soil Water Management	
	Project 1: Salinity tolerance	
1	Exploring new sources and advance breeding lines for salinity tolerance from at seedling stage	Two (2) germplasm namely Mohislama and Pooshpai and one advanced breeding line (BR12274-4R-113) were found tolerant with SES score 3.
2	Re-evaluation of previously screened saline-tolerant germplasm for salinity tolerance at the seedling stage.	Out of 25 germplasm 2 germplasm (Acc. No. 2779 and 3155) including one check (Nona Bokhra) were found tolerant with SES score 3 and 4 germplasm (Acc. No. 2780, 3005, 3142

		and 3157) including 3 check (IR58443, Pokkali and Horkuch) were found moderately tolerant to salinity.
	Project 2: Submergence tolerance	
3	Exploring new sources of submergence tolerance	Out of 219 germplasm 58 germplasm were survived after de-submergence. On the basis of survivability, the BRRI Genebank accession number 2282, 2287 and 2290 performed better having SES score 5. Survivability of the tolerant check varieties FR13A and BRRI dhan79 had 97% and 37%, respectively whereas susceptible check varieties did not survive.
4	Screening for stagnant flooding tolerance of germplasm/advanced breeding lines	The plant height, tiller/hill, yield/hill and survivability were found to ranges from 94.60 -179.20 cm, 2.40 -10.80 tillers/hill, 0.33 -13.10 gm/hill and100%, respectively. Twenty grmplasm out of 168 were produced higher tiller/hill (>6) compare to check varieties BR10 and BRRI dhan30 under water stagnant condition. Among the 20 higher tiller producing germplasm 2 germplasm (namely, genebank Acc. No.2134 and 2143) were produced ≥10 tillers/hill under water stagnant condition.
	Project 3: Drought Tolerance	
5	Screening germplasm for drought tolerance at reproductive phase T. Aman 2023	Out of 300 germplasm, 50 germplasm showed better performance under

		rainfed condition at reproductive phase which were selected for further confirmation under control condition in rain out shelter.
6	Evaluation of previously selected germplasm under drought stress at reproductive phase in the rain-out shelter	Under control drought condition in the rainout shelter, out of 40 tested germplasm BRRI Gene Bank Acc. no. 2706 and 2728 were confirmed as drought tolerant. The sterility percentage of these genotypes was less than 50.
7	Confirmation of performance for AYT/RYT materials under drought stress at reproductive stage	Out of 7 RYT genotype, IR17L1360 performed better showing the yield reduction below 50% followed by BR12023-6R-111.
	Project 4: Heat Tolerance	
8	Screening for high temperature-induced spikelet fertility QTL introgression lines under controlled conditions.	Out of the tested 41 introgression lines, 10 lines showed moderate heat tolerance under controlled high-temperature conditions.
9	Screening for high temperature tolerance of advance breeding lines	Seven of the 36 advanced breeding lines evaluated were classified as moderately sensitive.
10	Marker assisted introgression of high temperature induced spikelet fertility QTL (*qHTSF4.1*) in the background of BRRI dhan48 and BRRI dhan62	The selected 24 lines were selfed and a total of 126 + 46 fixed lines were selected based on genotyping and phenotypic similarity
	Project 5: Cold Tolerance	
11	Exploring new sources of cold tolerance from BRRI Gene Bank collections at seedling stage	A total of 324 germplasm is tested and among them only 6 germplasm showed moderately tolerant at seedling stage.

12	Evaluation of breeding lines for reproductive stage cold tolerance	Twenty-three advanced breeding lines have been evaluated. The crop is harvested. Sampling and data collection are on-going.
13	Evaluation of BRRI Varieties under Natural Field Condition for reproductive stage cold tolerance	The crop is harvested. Sampling and data collection are on-going.
	Project 6: Growth and Yield Studies	
14	Study the Influence of Photo-thermal Quotient on the Growth and Yield of Rice under Varying Dates of Transplanting at different locations of Bangladesh.	Crop phenological data of Aman Season were collected. Analysis not yet done.
15	Reduction of pre-harvest sprouting of rice through chemical spraying	None of the chemical found effective under field condition. (Immediately after spraying rain occurred, assuming spraying not effective. Experiment will be repeat next year under rainout shelter in pot expt.).
16	Photoperiod sensitivity test of advanced breeding lines	Out of 201 advanced lines and three varieties, seventeen lines were insensitive Fourteen advanced breeding lines were strong photosensitive and three varieties were strongly photoperiod sensitive. Others lines were weakly photoperiod sensitive
17	Photoperiod sensitivity test of local germplasm and four BRRI released varieties	All the tested germplasm was strongly photoperiod sensitive. Among four BRRI varieties only BR11 was weakly photosensitive and other three BRRI

		released varieties were strongly photoperiod sensitive
18	Evaluation for lodging tolerance of BRRI developed T. Aman varieties	According to sowing date 15 June, among the tested varieties BRRI dhan75, BRRI dhan79, BRRI dhan80 was lodging tolerant. BRRI dhan76 and BRRI dhan77 were lodged partially. On the other hand, at other sowing date all the tested varieties were completely lodged due to Sitrang cyclone.
19	Characterization for lodging tolerance of BRRI released Boro varieties and advanced breeding lines	BRRI dhan96, BRRI dhan89, BRRI dhan61, BRRI dhan58, BRRI dhan47, SVIN109, BR11318-5R-63, IR17A1694 has lodging tolerance capacity in various aspect of morphological and anatomical lodging parameters.
20	Study of the grain filling characteristics of rice under different environmental conditions	Field data were collected. Analysis not yet done.
	Project 7: Genome editing	
21	CRISPR-Cas9 mutagenesis of the OsRR22 gene for improving salinity tolerance of rice	The guide sequence was properly cloned into the binary vector pC1300-Cas9. The binary vector pC1300-Cas9 harboring Cas9/*OsRR22* sgRNA was mobilized into *Agrobacterium tumefaciens* LBA4404 by freeze-thaw method and confirmed through PCR-gel electrophoresis. Plants were regenerated through *Agrobacterium*-mediated transformation. Genomic DNA was extracted from the leaves of

		transformed plants using the sodium dodecyl sulfate (SDS) method. Hygromycin phosphotransferase positive plants were identified using HPT primer pair designed from Hygromycin phosphotransferase resistant zone of the Cas9 vector. PCRs amplifications have been performed using primer pairs, which generated an amplicon harboring the target site. The resulting amplicons have been sequenced using the Sanger method and mutant plant have been identified where deletion of two nucleotides occurred at the target site. Salinity screening was done using T1 plants and found tolerant at 12 dS/m compare to its background variety BRRI dhan81.
22	Generation of male sterile rice line for two-line hybrid system by editing *TMS5* gene using CRISPR/Cas9 system	The guide sequences were properly cloned into the binary vector pC1300-Cas9. The binary vector pC1300-Cas9 harboring Cas9/*TMS5* sgRNA was mobilized into Agrobacterium tumefaciens LBA4404 by freeze-thaw method and confirmed through PCR-gel electrophoresis. Plants were regenerated through Agrobacterium-mediated transformation. Genomic DNA was extracted from the leaves of transformed plants using the sodium dodecyl sulfate (SDS) method. Hygromycin phosphotransferase

		positive plants were identified using HPT primer pair and sequencing are being done for mutation detection.
	Project 8: C4 rice research and development	
23	Investigation of anatomical differences in the leaves of rice and Uri dhan	The total area of the bundle sheath (BS) with vascular bundle of Uri dhan (0.08 sq.mm) is more than twice that of rice (0.03 sq.mm).
24	Wide hybridization between Latisail (AAAA) and Uridhan (KKLL)	Two F1 plants were selfed and further characterization ongoing.
25	Optimizing chlorophyll fluorescence imaging system for photosynthetic efficiencies of rice in the submergence stress	Quenching-Act1 protocol with two days of submergence and six days of recovery were found to be critical in differentiating submergence tolerance using Chlorophyll Fluorescence Imaging System.
	Project 9: Crop Weather Information	
26	Manual weather station data collection and maintenance	Manual weather data from BRRI head quarter and different regional stations has been archived.
	Entomology Division	
	Program Area: Pest Management	
1.	Experiment Title: Pest and natural enemy incidence at BRRI farm, Gazipur. Progress: Incidence of insect pest and natural enemies in different habitats (seedbed, ratoon, grass fallow, grass bund, transplanted rice, broadcast rice and rice bund) at BRRI farm, Gazipur was observed during Aus and T. Aman season 2023. Short horned grasshopper (SHG) was the most abundant pests found in grass fellow followed by transplanted rice and seedbed. Spider, green mirid bug, damsel fly and lady bird beetle were most abundant in grass fellow followed by transplanted rice, seedbed and ratoon.	At BRRI farm in Gazipur during Aus and T. Aman season, SHG were most abundant in grass fallow, followed by transplanted rice and seedbeds. Predatory insects like SPD, GMB, Dam. Fly., and LBB were most abundant in grass fallow, with transplanted rice, seedbeds, and ratoon also supporting significant populations.

2.	Incidence of insect pest and natural enemies in light trap. Progress: Rice insect pests and their natural enemies were monitored throughout the year by Pennsylvanian light trap from dusk to dawn BRRI HQ, Gazipur. Among the harmful insects, green leaf hopper (GLH), white leaf hopper (WLH), YSB were the most dominant species through reporting time. The prevalence of most of the harmful species were in November. Among the harmful insects BPH showed peaked in November followed by December. YSB, GLH showed highest peaked in October followed by November. Highest abundance of WLH was observed in November followed by October.	At BRRI HQ in Gazipur, rice insect pests and their natural enemies were continuously monitored using light traps throughout the year. Dominant harmful species included GLH, WLH, and YSB, with peak prevalence observed in November, while BPH showed peak activity in November-December, and GLH and YSB peaked in October-November, with WLH abundance highest in November-October.
3.	Survey and monitoring of rice arthropods in different AEZ of Bangladesh. Progress: The insect pest population, their damage intensities and abundance of the natural enemies were surveyed during T. Aman 2024 in transplanted rice field of different AEZ of Bangladesh. Insect pests were below the economic threshold level (ETL) during T. Aman 2023 and Boro 2023-24. Highest yellow stem borer (YSB) found in Barishal (5.03/20 sweep) followed by Rangpur (1.59) and Sylhet (1.44) and Rajshahi (1.41/20 sweep). The lowest was observed in Cumilla 0.17/20 sweep (Fig. 1). Leafroller (LR) population found highest at Sylhet (4.74/20sweep) followed by Barishal (2.02/20sweep) and Rangpur (1.47/20 sweep). Abundance of GLH was found highest in Rangpur (3.87/20 sweep) followed by Cumilla (3.55/20 sweep) and Sylhet (2.37/20 sweep). Highest spider (8.56/20 sweep) was found in Rajshahi followed by Sylhet (7.52/20 sweep), Barishal (2.93/20 sweep) and lowest in Cumilla (1.68/20 sweep). Among the natural enemies carabid beetle (CBB) and staphylinid beetle (STPD) were remarkably highest in Rangpur (27.42 and 3.7/ 20 sweep respectively) than other locations (Fig. 2). Damsel fly (Dam.fly) found highest in Rajshahi (3.83/20 sweep) followed by Sylhet (2.85/20 sweep) and Rangpur (2.83/20 sweep). Green mirid bug (GMB) and parasitic wasp (PW) were found highest in Sylhet, lady bird beetle (LBB) in Rangpur and Dragon fly (Drag. fly) in Barishal	Insect pests were below the economic threshold level (ETL) during T. Aman 2023 and Boro 2023-24. Highest yellow stem borer (YSB) found in Barishal (5.03/20 sweep) followed by Rangpur (1.59) and Sylhet (1.44) and Rajshahi (1.41/20 sweep). Leafroller (LR) population found highest at Sylhet (4.74/20sweep) followed by Barishal (2.02/20sweep) and Rangpur (1.47/20 sweep). Abundance of GLH was found highest in Rangpur (3.87/20 sweep) followed by Cumilla (3.55/20 sweep) and Sylhet (2.37/20 sweep). Highest spider (8.56/20 sweep) was found in Rajshahi followed by Sylhet (7.52/20 sweep), Barishal (2.93/20 sweep) and lowest in Cumilla (1.68/20 sweep).
4.	Effect of temperature on the biology and life cycle of rice leafroller, *Cnaphalocrosis medinalis*.	In a growth chamber at 20⁰C, the RLR took longer to complete its life cycle,

	Progress: The growth duration of different developmental stages of rice leafroller (RLR), *Cnaphalocrosis medinalis* from egg to adult has shown differences in changing temperature and at 65% relative humidity in the growth chamber. Overall, in lowest temperature (20ºC), egg incubation period to adult longevity duration was higher compared to 25ºC and 30ºC and they completed their life cycle for 28 days which was higher in 25ºC.	spanning 28 days from egg incubation to adult longevity, compared to 25ºC and 30ºC conditions. Lower temperatures prolonged developmental stages, with 25ºC showing intermediate durations for RLR's life cycle.
5.	Conservation of natural enemies through eco-engineering. Progress: Insect pests status remained below the economic threshold level (ETL) in both the treatments. Highest number of grasshopper (GH) was found in T_2 (3.440/20 sweep) followed by brown planthopper (BPH) 2.75/ 20 sweep, white leafhopper (WLH) and green leafhopper (GLH) 1.5/20 and 0.5/20sweep. The ranged of other insect pests like, yellow stem borer (YSB), rice bug (RB) and rice leaffolder (RLF) was found (0.75 to 1.750/20 sweep respectively) in T_2 and (0.5 to 0.75/20 sweep respectively) at BRRI Gazipur. Number of spider (SPD), damsel fly (Dam. fly) and lady bird beetle (LBB) were found highest 5.25, 4.5 and 1.25 per 20 complete sweep respectively in T_1 compared to T_2 (4.50, 3.75 and 1.0 respectively/20 sweep) at BRRI farm, Gazipur. Rice leaffolder larval parasitism and YSB egg parasitisim observed highest in T_1 (37.8 and 36.84 % respectively) compared to T_2 (2.75 and 1.25 % respectivley).	Highest natural enemies, % egg parasitism of YSB and larval parasitism of rice leaffolder were observed in rice field with nectar-rich flowering plants on bunds (Eco-engineering). However, least natural enemies and parasitism were found in farmer's practice rice field where four times insecticides were applied. Moreover, there was no yield reduction observed in eco-engineering field compared to farmers practice field (insecticide application).
6.	Study on the biology of green mirid bug, an egg predator BPH. Progress: Rearing tested on different hosts eg. Corcyra egg and larva, flowers of bottle gourd and other flowering plants but with no success. GMB didn't complete life cycle.	Rearing tested on different hosts eg. Corcyra egg and larva, flowers of bottle gourd and other flowering plants but with no success. GMB didn't complete life cycle.
7.	Stem borer species abundance and assessing yield losses. Progress: In Aus DHB was the dominant species followed by Striped stem borer (SSB). In Aman YSB was the dominant species followed by SSB and DHB. Total 37 stem borer larvae were found from 93 tiller dissection in Aus and 167 stem borer larvae were found from 506 tiller dissection in Aman season.	During the Aus season, DHB was the dominant species, while YSB prevailed during the Aman season, with significant variations in stem borer larvae numbers observed between the two seasons.
8.	Test of different insecticides against major insect pests. Progress: Total 103 and 33 insecticides was tested against BPH and YSB respectively. Among	Effective 31 and 7 insecticides against BPH and YSB has recommended for registration.

	them 31 and 7 insecticides showed effective result against BPH and YSB.	
9.	Use of nanoparticle to control rice insect pests. Progress: Three nanoparticles including Ag, Cu and ZnO were tested against BPH at 5 different concentration viz. 0ppm, 250ppm, 500ppm, 750ppm and 1000ppm. Ag nanoparticle showed comparatively higher mortality than Cu and ZnO against BPH at 1000ppm. Ag, Cu and ZnO nano-particles showed 24, 18 and 22 % mortality of BPH nymph respectively.	Silver nano particles showed highest 24% efficacy against BPH.
10	Pesticidal effect of different botanicals against Rice weevil (*Sitophilus oryzae* L). Progress: An experiment was laid out following Complete Randomized Design (CRD) with four treatments along with one control (untreated) and three replications in BRRI, Gazipur. The treatments were: T0 = Control, T1 = 1ml neem oil, T2 = 2g mahogany seed kernel powder, T3 = 2g neem leaf powder, and T4 = 2g biskatali powder. Highest mortality of rice weevil was found in T4 treatment followed by T1, T2 and T3 treatment at 24 hours after treatment (HAT). But in case of 48 HAT T1 showed highest mortality followed by T3, T2 and T4. T1 showed highest mortality after 72 HAT followed by T4, T3 and T2. In case of 96 HAT T1 showed highest mortality and T2, T3, T4 showed identical mortality. Highest percent mortality of rice weevil was recorded at T1 which was followed by T4, T3 and T2 respectively. Highest number of F 1 was emerged at to (untreated control) followed by T4, T3 and T2. Lowest number of F1 emerged was found at T1 due to highest mortality of rice weevil.	Neem oil and Biskatali plant powder showed 85 and 75% rice weevil mortality respectively.
11	Effect of different insecticides on susceptible GLH Population. Progress: International resistance action committee (IRAC) susceptible test method 005 was performed (IRAC, 2022) in lab condition with 25˚C temperature and 70% humidity with greenhouse GLH population. Six different insecticides group were used in the bioassay test at six concentrations of each insecticide group solutions with three replications and the design was complete randomize design (CRD). In Dursban 20 EC, none of the concentrations, including recommended dose 400 ppm even 8 samefold of the recommended dose 3200ppm failed to show mortality 80% or above at 24 hours after spray (HAS). The highest mortality of green house GLH (86.66%) of Dursban 20 EC was found @ 3200 ppm at 72 HAS. The recommended dose of dose Nitro 55EC is 500 ppm for field crops except rice. It was found that more than 80% mortality occurred @ 8.0 ppm at 24 hours after treatment. But it is widely use in the rice field @500 ppm	Eight folds of the recommended dose 3200 ppm Dursban 20 EC failed to show GLH mortality 80% or above at 24 hours after spray (HAS). Nitro 55EC kills all living organisms both in the terrestrial and aquatic rice ecosytems. Which disrupt the faunal biodiversity in the ecosystem as well as it creates negative impact on envirionment. It is urgently needed to banned such type of insecticide use in the rice field.

	(extreme dose).	
12	Effect of different insecticide on resistance GLH population. Progress: International resistance action committee (IRAC) susceptible test method 005 was performed (IRAC, 2022) in lab condition with 25°C temperature and 70% humidity with greenhouse GLH population collected from Cumilla. Same methodology was used as describe in susceptible GLH Population.	Like wise susceptible GLH population Dursban 20 EC was more in-effective to show GLH mortality 80% or above at 24 hours after spray (HAS). Nitro 55EC kills all living organisms both in the terrestrial and aquatic rice ecosytems including field collected resistance GLH population with very low dose.
13	Effect of insecticides on natural enemies of rice insect pests. Progress: Total natural number of NE and other non-pest, comparable with control were found in fipronil, cartap, tetraniliprole + fipronil, Abamectin. Lowest number was found in clothianidin. So these insecticides may be considered as safer for NE.	Safe and effective insecticide will be detrmined.
14	Residue analysis of different insecticide in rice. Progress: Insecticide residue analysis through LCMS 2022 showed that application of insecticide chlorantraniliprole three times in rice field with recommended dose and double of the recommended dose have no effect on rice grain. But application of thiamethoxam with the same doses 0.014 and 0.034 mg kg^{-1} insecticide residues were detected in rice grain. The detection level of thiamethoxam were below the EU MRL level 0.6 mg kg^{-1}. Chlorantraniliprole insecticide was applied 5, 10 and 15 days after flowering (DAF) of rice plants and no residues were found in grain of 5 and 10 DAF samples but chlorantraniliprole spray at 15 DAF samples contained 0.039 mg kg^{-1} residues which is less than EU MRL 0.4 mg kg^{-1}.	Insecticide (chlorantraniliprole and thiamethoxam) residues were not found above the MRL level in rice grain when applied in standard or double of the standard doses during rice growing season.
15	Development and validation of analytical methods for multiple pesticide residue determination in rice grain using LC-MS/MS. Progress: Method development for multiple residue analysis of five insecticide namely diazinon, dinotefuran, imidacloprid, pymetrozine and malathion were standardized by Shimadzu LCMS/MS 8050. Detection of the above-mentioned insecticides was carried out with the positive	Multiple pesticide residue determination in rice grain will be determined by the developed methods using LC-MS/MS.

	ion mode of the ESI probe. Detection was carried out in multiple reaction monitoring (MRM). The pesticide residue database of the LCMS/MS system was used for the data analysis. QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) Method for Pesticide Residue Analysis (Method AOAC 2007.01) was applied for sample preparation.	
16	Screening of rice germplasm, advance line against BPH, WBPH, GLH. Progress: Total 476 lines were screened against BPH during T. Aman 2023. Among them only single line showed moderately resistant score 3 (BR12208-5R-343) and 24 lines showed moderately susceptible (score 5) against BPH.	Total single line showed moderately resistant score 3 (BR12208-5R-343) and 24 lines showed moderately susceptible (score 5) against BPH during T. Aman 2023.
17	Suppression of serotonin synthesis in rice using CRISPR Cas9 for insect pest control. Progress: Serotonin is ubiquitous across all forms of life and in mammals it is well known as a neurotransmitter and in insects it is thought to be involved in behaviour and immunity. Serotonin also is involved in plant growth, development and response to biotic and abiotic stresses. In rice, the gene CYP71A1 encodes a cytochrome P450 monooxygenase, which exhibits tryptamine 5-hydroxylase enzyme activity, catalyzing the conversion of tryptamine to serotonin. Recent studies on serotonin in rice plants and insect resistance, suggesting a potential role of serotonin in the regulation of insect resistance. To develop insect resistant rice variety using clustered regularly interspaced short palindromic repeats (CRISPR) Cas9 genome editing tool we contructed vector VK005.01 and transformed into Agrobacterium tumefaciens LBA4404 competent cell. Calli of BRRI dhan89 was developed using tissue culture technique. Successful calli were co-cultivated with recombinant Agrobacterium.	Successfully a vector was constructed and calli were co-cultivated with recombinant Agrobacterium.
	Plant Pathology Division	
	Program Area: Pest Management	
1.	**Survey and monitoring of rice diseases in selected areas:** Disease survey was conducted in different rice ecosystems (covering 9 districts) during T. Aman 2023. Incidence pattern and severity of rice diseases over the locations and varieties were assessed. Three upzillas in each district were selected for disease survey. Disease incidence (%) and disease severity data of major rice diseases were recorded following SES IRRI, 2013.	Web-based rice disease information platform will be developed
2.	**Studies on the population biology of rice blast pathogen (*Magnaporthe oryzae*) in**	The virulence pattern of Aus isolates

		was similar to the virulence pattern of Aman isolates. It indicated no new races were involved for Aus infection.
3.	**Characterization of blast isolates collected from different hosts:** Blast pathogen were isolated from Kaun, wheat and grass. Pure culture was made and cultural, sporulation data on different media are being taken.	Distinct differentiations were found among the blast isolates collected from different hosts.
4	**Development of blast resistant varieties using differential system and molecular markers:** Proposed Variety Trial (PVT) -5, Advance Line Adaptive Research Trial (ALART) -6, Regional Yield Trial (RYT) -24, Advance Line Trial (OT, PYT, MLT, etc.) -2947	Two lines were selected as blast resistance and higher yield.
5	**Detection of novel loci underlying rice blast resistance by integrating a genome wide association study:** Genome-wide association (GWAS) mapping of resistance against rice blast races in Bangladesh and identification of new allele	The association study revealed three major quantitative trait loci (QTL) for isolate-1 and 11 QTL for isolate-2 among tested germplasm.
6.	**Phenotypic and Molecular Characterization of Rice Blast Resistance in Native Rice Germplasm in Bangladesh:** On going	Phenotyping characterization has already completed but genotyping not yet done.
7.	**Effect of Fungicide on Microbial Community in Rhizosphere of rice:** For the enumeration of bacterial population in the soil samples serial soil dilution was done. The slimy, colorless and colored bacterial colonies appeared in the NA medium after 72 h incubation. Maximum number of colonies found 3 days before fungicide spray in all treatments (Fig. 1). And the number of colonies significantly reduced after spraying Amister top. The toxic effects of the fungicides were more pronounced immediately after the application of fungicides. On the other hand, with an increasing incubation period, the bacterial population tended to increase. After 28 days it became stagnant and there is no significant difference with before Amister top spray.	This research hopes to make a significant contribution toward sustainable disease management strategies
8.	**Evaluation of new fungicides against sheath blight disease of rice:** Tested chemicals reduced the sheath blight severity (%RLH) ranging from 32% to 85%. Average of both locations showed that 11 chemicals Synblast, Babit, Virgen, Absotop, Ulka, Trizole, Sabit 28SC, Greenvo 75WP, Tebubin, Planter, and Peril reduced disease over 80%.	Identified effective fungicides suitable for sheath blight management.
	Present health status of rice seed in Bangladesh: Seeds of T. Aus, T. Aman and Boro rice of farmers, DAE, BADC Dealer and BRRI were collected from Shatkhira, Cumilla, Rajshahi and Habiganj. Tested varieties were BRRI dhan48 for Aus, and BRRI dhan28, BRRI dhan29, BRRI dhan81 and BRRI dhan92 for Boro seasons. Irrespective of variety and seed source 18 different	Known the seed infection status in Bangladesh.

	seed borne pathogens were detected from T. Aus and Boro seeds. The lower incidence of seed borne pathogens was recorded in BRRI seed precedingly followed by BADC dealer and DAE seed where as higher incidence was observed in farmers' own seed. During Boro season the higher incidence of seed borne pathogens was recorded in BRRI dhan28 followed by BRRI dhan81, BRRI dhan29 and BRRI dhan92. T. Aus seed was observed with higher infection of seed borne pathogens followed by Boro and T. Aman seeds.	
	Suppression of microbial development by hydrogen peroxide: Commercial H_2O_2 (6%) was mixed with PDA and PSA media for fungal and bacterial growth, respectively. Treatments for H_2O_2 were T_1 (1.0 M), T_2 (10^{-1} M), T_3 (10^{-2} M), T_4(10^{-3} M) and T_5 (10^{-4} M). Standard control (T_6), diseased control (T_7) and healthy control (T_8) were maintained. Amistar top, Trooper, Streptomycin were used as standard control for sheath blight, blast and BLB pathogens, respectively. H_2O_2 @ 1.0-0.1M completely inhibited mycelial growth of *Pyricularia oryzae* and *Rhizoctonia solani* whereas *Xanthomonas oryzae* pv. *oryzae* was completely inhibited by 1.0-0.01M H_2O_2. Concentration @ 1.0 M reduced Sheath blight disease compared to Amister Top in pot experiment. Reduction of leaf blast disease in nursery seed bed by exogenous application of H_2O_2 at 1.0-0.1M concentration was comparable with Trooper.	Low dose of H_2O_2 (6%) is found suitable for management of blast, Sheath blight and BB.
9.	**Characterization of Upland Aus Rice Genotypes to blast:** A total 24 Aus germplasms were collected from India, Philippines, Thailand, Ivory Coast, Malaysia and Bangladesh. They are grouped into eight cluster according to SSR and ISSR marker. Antioxidant data, Blast score, Morphological data, Physical properties, Chemical and cooking properties were taken. Here we can see Malaysian genotypes are taller than other genotypes. It also flowers early, which is a useful trait because early flowering enhances early heading, mature earlier. In term of antioxidant properties all Malaysian genotypes have higher antioxidant properties (TPC, FRAP, TAC). They are also resistance to blast disease	Phenotyping characterization has already completed but genotyping not yet done
10	**Identification of blast resistant novel QTLs in BRRI dhan33/BR16:** Blast resistance BRRI dhan33 was crossed with universal blast susceptible US2. Three back-cross was done using US2 as recurrent parent. F7 advanced generations were developed. Phenotyping was done in the blast screening platform nursery. A total of 410 recombinant populations (F7) for each were developed for mid-level gene sequencing and bioinformatics analysis.	Phenotyping characterization has already completed but genotyping not yet done..

11	**Development of Early Warning System (EWS) of rice blast disease:** Weather-based EWS of rice blast are now developing with the collaboration of different national and international agencies. Five trials including 3 cultivation date, 4 varieties and 3 replications were established at Gazipur (2), Cumilla, Rangpur and Barishal. Artificial environmental conditions were created by polyethylene house and automated mist irrigation system.	**Condition 1**: The average minimum temperature for the past 14 days is >21 ºC. **Condition 2:** Averagedaily temperature for the past 14 days >25.5 ºC. **Condition 3:** Average humidity >85% for at least 14 consecutive days.
12.	**Screening of breeding lines against blast disease:** Total 137entries were screened. Among them 19 identified as moderate resistant.	Identified the source of resistance against blast disease of rice.
13.	**Genotype and environmental interaction on neck blast incidence in blast prone area:** Seedling were transplanted in the experimental field.	The pattern of neck blast incidence in relation to variety and environment will be understood.
14.	**Identification of critical climate status for rice blast disease outbreak:** On going.	Critical climate status for rice blast disease outbreak will be identified.
15	**Characterization of blast pathogen isolates collected from different hosts:** Blast pathogen were isolated from Kaun, wheat and grass. Pure culture were made and cultural, spouralation data on different media are being taken.	Various fungal morphological characteristics will be investigated
16.	**Identification of the Source of Infection of Major Rice Diseases T. Aman 2023:** On going.	The source of infection and predisposing factors of major rice diseases will be found out.
17.	**Evaluation of biopesticides for Rice Pest management (PARTNER) (ongoing) :** Effectiveness of *B. thuringiensis* (Bt) found better compared to *Serratia* sp. Formulation for management of stem borer adult and egg mass as well.	Effective biopesticide will be commercially developed for stem borer and/leaf folder.
18.	**Sheath blight disease resistance in rice through Crispr-Cas9 genome editing:** The rice sugar transporter gene OsSWEET11 was selected for completely and permanently silences the gene at the DNA level through Crispr-Cas9 knockout system. Targeted sites of OsSWEET11were on chromosome 8 and the locus id LOC_Os08g42350 were identified by using the web based tool such as "Rice Genome Annotation Project" (http://rice.uga.edu/index.shtml) and rap-db (https://rapdb.dna.affrc.go.jp). Genomic sequence , CDS and protein sequence were downloaded from "NCBI database" (https://www.ncbi.nlm.nih.gov). Vector specific and gene specific forward and revers primer were designed from with "Primer Primer" software. The CRISPR-Cas9 based	This induced mutation will help to generate disease resistant rice varieties.

	pRGEB32 vector and the designed primers were already brought. Now vector construction is running in the laboratory.	
19.	**Development of Blast Resistance Rice by CRISPR/Cas9-Targeted Mutagenesis of the *OsERF922* gene:** The sequence of *OsERF922* gene was cloned into the binary vector pC1300-Cas9. The binary vector was mobilized into *Agrobacterium tumefaciens* and confirmed through PCR-gel electrophoresis.	Blast resistant pre-breeding materials/variety will be developed
20.	**Development of pre-breeding materials of tungro resistance:** BC2F1, BC3F1, BC4F1 and BC5F1 seeds from different crosses were produced. Three hundred plants were selected from 600 plants in Aman, 2020 and these lines were advanced during Boro,2020-21.	Resistant source against Tungro disease will be developed
21.	**Studies on the genetic mechanism of rice blast and gall midge resistance in BRRI dhan33:** The mapping population of BC1F2 family lines (US2/BRRI dhan33//US2) were developed. Among 625 markers, 184 markers showed polymorphic between BRRI dhan33 and US2.	Gene(s) responsible for rice blast and gall midge resistance will be identified
22.	**Phenotyping and genotyping of rice varieties for blast resistance:** only marker assisted selection/ identification even with gene-based markers do not indicates the resistance to blast rather the pathotypic reaction with variable differential isolates	Resistance source against blast disease will be identified
23.	**Identification of the Source of Infection of Major Rice Diseases – Blast and False Smut:** From two years results revealed that in 2022, blast disease was significantly higher in diseased seed compare to healthy seed ($P<=0.05$). In the previous year (2021), there was a tendency of higher blast incidence in diseased seed source; however, the difference was not significant with healthy seed source (Figure 1). On the other hand, rice false smut is a very tricky disease. In 2021, the difference of disease incidence was not significant between diseased and healthy seed sources. In the following year (2022), rice false smut disease did not appear in the experimental field.	The indication is there that the diseased seeds could be a source of natural infection in both blast and false smut disease. However, to reach a more conclusive results, the research is continuing this year (T. Aman 2023).
24.	**Blast yield loss model development:** Both the dataset (2019 and 2021) fitted in the same POWER function in MS Excel (Figure 1A) and more importantly showed a similar trend and very close magnitude of yield loss against the 10 categories of filled grains percentage. Having closeness of the characteristics of the data, a power function-based model was developed using the both datasets (from 2019 and 2021) as shown in Figure 1B.	The multi-year data, collected from farmers' fields, summarized in a model providing an easy-to-estimate of yield loss in relation to percentage of grains in blast-affecting panicles. The model has the scope of its application in quantifying the yield loss for wide range of varieties beyond BRRI dhan28 due to the disease.

25.	**Detection of novel loci underlying rice blast and BB resistance by integrating a genome-wide association study and evaluation of resistant genes:** Bacterial blight (BB) resistant 21 entries have selected out of 186 local germplasm in Bangladesh.	Blast and bacterial blight resistant pre-breeding materials/lines will be developed
27.	**Screening of rice germplasm against Bacterial blight disease:** Four hundred germplasms were tested against bacterial blight disease. Only two were found as moderately resistant material where as 19 moderately susceptible. 148 genotypes did not germinate.	New resistant sources against bacterial blight disease identified.
28.	**Screening of advanced breeding lines against sheath blight of rice:** Two lines BR9888-19-4-7 and BR9143-25-7-2-2 showed resistant reaction out of 86 genotypes.	Sheath blight resistant lines identified.
29.	**Screening of breeding lines against blast disease:** Total entries = 137. Missing/ not germinated entries = 18. R = 0, MR = 19 (Severity-3), S = 100	Identified the source of resistance against blast disease of rice
30.	**SSR marker-based diversity analysis of upland rice (*Oryza sativa L.*) germplasm:** A total of 86 alleles were detected by the 28 polymorphic SSR markers. The germplasms were classified based on the polymorphism data into nine cluster groups, cluster I- cluster IX	Source for Uupland rice identified.
31.	**Crop Loss Assessment of rice due to major diseases in Bangladesh:** Data on major disease of rice were collected. Collected Data are under process.	Yield loss due to major diseases will be determined.
32.	**Green synthesis of nano-particles:** Silver, Zinc-oxide and silica nano was produced from Neem leaf extracts while Copper oxide nano particle was produced from Tulsi leaf extracts. All nano particles were confirmed using UV-vis spectrophotometer.	Nano-particles will be synthesized for disease management
33.	**Determination of residual effect of trifloxystrobin, tebuconazole and tricyclazole in rice grain under field conditions:** Detection of residual effect of Trifloxystrobin and tebuconazole group of fungicides are under progress.	Residual effect of pesticides will be detected
34.	**Biological control of sheath blight disease:** Identified two bacteria which have shown strong antagonistic activity against *R. solani.*	Rice diseases could be managed Biologically
35.	**Evaluation of new chemicals against Blast disease of rice:** 7 fungicides (mostly Tricyclazole group fungicide) controlled more than 80% blast disease	New chemicals for blast disease management identified.
36.	**Evaluation of effective chemical against rice Sheath Blight disease:** Six fungicides were found effective against sheath blight disease (80% or above). The highest reduction was recorded in Synblast, and Babit (85%) treated plot followed by Virgen, Absotop, Ulka, Trizole (84%). Sabit 28SC, Greenvo 75WP showed 83% disease reduction, and Tebubin, Planter, and Peril showed 81	New chemicals identified for sheath blight disease management.

	to 82% disease reduction over disease control plot.	
37.	**Chemical control of sheath rot and false smut disease of rice under different planting time:** The response of fungicides in controlling both sheath rot and false smut was not evident in this experiment.	No interaction was observed between chemicals and planting time for sheath rot and false smut disease management.
38	**Efficacy of Cu Chitosan and Zn Chitosan nano particles against rice bacterial blight *in-vitro*:** Four concentrations (10:1, 6:4, 4:6, and 8:2 dilution) of CuChNPs were tested, all the studied NPs considerably reduced Xoo's growth in vitro through a dependent on dosage (Figure 1). Furthermore, the development of *Xoo* was significantly reduced by CuChNPs: W = 10:1 (inhibition zone 32 mm) and bismerthiazol (inhibition zone 35 mm) in vitro. The concentrations (6:4 and4:6) also showed promising inhibition zone 27 mm and 21 mm respectively.	Cu Chitosan and Zn Chitosan nanoparticles successfully can inhibit Xoo.
	Farm Machinery and Postharvest Technology Division & Workshop Machinery and Maintenance Division	
	Programme Area: Farm Mechanization and Postharvest Technology	
1	*Experiment:* **Performance of head feed combine harvester as affected by paddy field length, plant density, and crop cutting height** *Progress:* ▪ An initiative was taken to test two types of head feed combine harvesters (Kubota PRO588i-G and Daedong DXM73). ▪ To observe the performance of the combine harvester considering the factors of field length, crop cutting height, and crop density. ▪ To identify the break-even point of the studied combine harvesters and compare the economics of paddy harvesting with traditional harvesting systems. ▪ A Break-Even Point was found for the Kubota combine harvester, which is 25 ha/yr. and for Daedong combine harvester 23 ha/yr. ▪ The performance test will be conducted again in the coming season after these issues have been resolved.	▪ The longer field length, low plant density, and high crop cutting height increased the field performance of both combine harvesters. ▪ The Kubota combine harvester performed better compared to the Daedong combine harvester.
2	*Experiment:* **Assessment of BRRI Whole Feed Combine Harvester (Model-BRRI WCH2021) for Mechanized Rice Cultivation** *Progresses:* ▪ A detailed report (model-wise and operational hour-wise data) will be presented in the next	A whole feed combine harvester will be available

	annual research review workshop.	
	▪ The failure frequency of fast-moving combine harvester spare parts increased with the operational hour or season.	
	▪ The most frequently failure spare parts were identified as cutting blades, different kinds of belts, bearings, fingers, chains, and threshing teeth.	
	▪ During peak and off-peak harvesting seasons, spare parts failure hampered the operation.	
	▪ It is necessary to make these spare parts locally available as soon as possible to farmers.	
3	*Experiment:* **Identification and Fabrication of Fast-Moving Spare Parts of Combine Harvester Enhancing Sustainable Mechanization in Bangladesh** *Progresses:* ▪ A detailed report (model-wise and operational hour-wise data) will be presented in the next annual research review workshop. ▪ The failure frequency of fast-moving combine harvester spare parts increased with the operational hour or season. ▪ The most frequently failure spare parts were identified as cutting blades, different kinds of belts, bearings, fingers, chains, and threshing teeth. ▪ During peak and off-peak harvesting seasons, spare parts failure hampered the operation. ▪ It is necessary to make these spare parts locally available as soon as possible is necessary to make mechanical harvesting sustainable and economically viable.	An inventory of combine harvester quick failures parts will be available that will be helpful for users, manufacturers, and business-oriented people
4	*Experiment:* **Ground pressure and bearing capacity of combine harvester in different soil conditions** *Progresses:* ▪ Factors for ground pressure and bearing capacity of different combine harvesters were determined. ▪ The soil texture of the study area was determined at BARI west byde, Gazipur, and rice field at Anandopur, Habigonj at 10, 15, and 20 cm of the soil depth. ▪ Ground pressure and bearing capacity of combine harvester in different soil conditions will be measured. For that, the specification of the required equipment for the experiment was submitted for procurement. ▪ The study will be conducted thoroughly after receiving the equipment for the experiment.	A guideline will be available to operate the combine harvester in a wetted field
5	*Experiment:* **Design, Development, and Fabrication of BRRI rice transplanter for mechanized rice transplanting in Bangladesh**	A rice transplanter will be available

	Progresses: ▪ The design and fabrication of BRRI rice transplanter works were conducted in the BRRI research workshop. ▪ The fabricated BRRI rice transplanter was tested in the West Byed research plot at Bangladesh Rice Research Institute in the presence of the Director General, Director (Research), Director (Admin & common service), Project Director, All Divisional Heads and Scientists during Aman 2023. ▪ The fabricated BRRI rice transplanter was also tested at BRRI Mechanized village Jessore and Rajshahi during Aman 2023 and data to be collected. All the members present at the field test expressed satisfaction with the effectiveness of the BRRI rice transplanter.	
6	***Experiment:*** **Design and development of a BRRI semi-automatic rice transplanter** ***Progresses:*** ▪ The design and fabrication of BRRI semi-automatic rice transplanter works were conducted in the BRRI research workshop. ▪ An experimental field trial was conducted in the West Byed research plot, BRRI, and the BRRI mechanized village Bogura and Rajshahi during Aman 2023, and data will be collected. ▪ The machine's overall performance is good, especially the transplanting mechanism. ▪ Some mechanical faults were identified during the field operation, such as machine turning problems and machine weights.	A semi-automatic rice transplanter will be available
7	***Experiment:*** **Design, development, and fabrication of BRRI compact rice mill** ***Progresses:*** ▪ A BRRI compact rice mill was fabricated using locally available materials in the Salam Engg. Workshop, Dinajpur. BRRI provided design, drawing, technical, and financial support for the machine's development and manufacture in that workshop. ▪ The performance of the BRRI compact rice mill was done at the Salam Engg. Workshop, Dinajpur. ▪ All the members present at the field test expressed satisfaction with the effectiveness of the compact rice mill. ▪ The development and details study will be completed in the next Boro and Aman seasons, 2024 and 2025.	A compact rice mill will be available
8	***Experiment:*** **Effect of huller speed and flow rate of BRRI Mini rice on milling recovery of different parboiled rice varieties**	A guideline will be available to operate the huller mills effectively

	Progresses: ■ The study involves testing various rice types, such as BRRI Dhan 96 and BRRI Dhan 87, under two huller speeds of 1000 and 2350 rpm. ■ The study identifies that a huller speed of 1000 rpm with a polishing pressure setting at position 5 yields favorable results for the milling process. ■ This investigation contributes valuable insights into rice milling operations, offering practical recommendations to enhance milling recovery in rice production.	
9	*Experiment:* **Test, evaluation, and modification of rubber roll de-husker and friction-type polisher** *Progresses:* ■ A detailed test was conducted. ■ The average de-husking capacity of the husker was 803 kg/h, and husking efficiency was about 90.00%. ■ The average brown rice percentage was 76.57%, and the rest was husk and embryo. ■ Brown rice of BRRI dhan107 from rubber roll de-husker was polished in friction type polisher. ■ The average capacity of the polisher was 962 kg/h, and the average milling recovery was 60.8 %. ■ The average head rice recovery (based on input paddy) was 50.33 %, and head rice recovery (based on total milled rice) was 83.00%, which is encouraging for quality rice processing. ■ The broken rice percentage was 10.47 % (based on input paddy) and 17.00% (based on total milled rice).	A comprehensive guideline will be available to run the rubber roll de-husker and polisher
10	*Experiment:* **Drying and Tempering Effect on Kernel Strength of the Parboiled and Un-parboiled Paddy** *Progresses:* ■ The experiment was initially set up on the rooftop of the farm machinery office building. At that time, there was a lack of proper sunlight. ■ This lack of sunlight hindered the expected change in the moisture content of the paddy grains. Consequently, the data collection process was improper during that period. ■ This experiment will be carried out in the next season.	A guideline will be available
11	*Experiment: Study on solar energy utilization for small agricultural machinery* *Progresses:*	Solar power utilization mechanism will be available to operate small farm

1	- Three foldable panel combinations were introduced. - Now, opening folders is much less complicated with three folders. - A new high-quality motor with a differential gear mechanism has been incorporated into the carrier. - Now, only two workers are required to open the folders. - Field tests will be conducted to evaluate the performance of the system.	machinery
12	*Experiment:* **Design and development of solar power-operated sprayer** *Progresses:* - The design and drawing of the operated sprayer have been completed using Auto CAD Engineering drawing. - Fabrication procedures will continue, and a prototype will be developed before Aman Season 2024 - A detailed report (model-wise and operational hour-wise data) will be presented in the next annual research review workshop.	A solar-powered sprayer will be available.
13	*Experiment:* **Assessing the Impacts of Future Climate Extremes on Boro Rice Cultivation in the Northeastern Haor Region of Bangladesh.** *Progresses:* - Factors related to Boro cultivation were finalized. - The optimization of the factors was done to assess the performance of the model. - A detailed report (model-based data) will be presented in the next annual research review workshop.	A guideline will be available
	Agricultural Economics Division	
	Program Area: Socio Economics & Policy	
1	Farm level adoption and evaluation of modern rice cultivation in Bangladesh Objectives: - To determine the region-wise adoption rate of different MVs in Aus, T. Aman and Boro seasons; - To estimate the yield of different modern and local rice varieties in different seasons; and	Regions and different season-wise varietal adoption rates and yields will be delineated.

	Status: Data collection is in progress	
2	Estimation of Costs and Return of MV Rice Cultivation at the Farm Level Objectives: • Delineate input use pattern in modern Aus, T. Aman and Boro rice cultivation; • Estimate the profitability and risk of modern Aus, T. Aman and Boro rice cultivation at farm level. Status: Data analysis of Aus and T. Aman is completed. Boro season data collection is ongoing	Farmers did not use balanced fertilizers. The total costs of T. Aus and T. Aman rice cultivation were 120847 Tk./ha and 132206 Tk./ha, respectively. On full cost basis the benefit-costs-ratio of T. Aus and T. Aman rice cultivation was 1.13 and 1.23.
3	Producers' welfare loss in Bangladesh: An assessment of rice market distortion Objectives: • To estimate the rice supply function in Bangladesh. • To assess the impact of changes in paddy market price on the welfare of rice producers. Status: Completed	A rice supply function has been developed empirically. Based on the government declare procurement price, the producers lost on average 54.37 million Tk of their surplus per Boro season during the estimation period 2000-2023 due to the market manipulation and oligopsony power by the traders. However, after the initiation of the COVID-19 pandemic, the producers are gaining surplus.
4	Impact of poverty reduction on nutrition security in Bangladesh Objective: • to examine the impact of poverty reduction of the farmers on the nutrition security in Bangladesh. • Suggest some policy guidelines from aforementioned findings. Status: Yearly Report Completed	Over the three-panel period, due to the reduction of the poverty gap by 1%, household nutrition security increased by 24.5%.
5	Prospect and Constraints to Adoption of BRRI Released Modern Rice Varieties in Bangladesh: A Case of Rajshahi District Objectives: • To identify the drivers and constraints of the adoption of rice varieties in different seasons;	Rice cultivation status in the study area and problems and opportunities of modern technology adoption will be identified.

	• To delineate the prospect for BRRI varieties for large-scale adoption at the farm level.. Status: Data collection is ongoing	
6	Adoption status of BRRI developed different technologies (other than rice variety) in Bangladesh. Objectives: • to know adoption status of BRRI developed different technologies in selected areas to identify the reasons of adoption and non-adoption of those technologies Status: Data collection is ongoing	Adoption level of different technologies in farmers level will be estimated.
7	Effect of demonstration in the adoption of newly released BRRI rice varieties and its impact on rice production Objectives: • To assess the magnitude of farmers awareness and interest about the new rice varieties; • To analyze profitability of BRRI released varieties over popular existing varieties; • Factor affecting adoption of BRRI released new rice cultivars; and, • To identify the problems towards the adoption of BRRI released new varieties. Status: Data collection is ongoing	Rice varietal preferences of farmers in study regions will be identified.
	Agricultural Statistics Division	
	Program Area: Socio Economics and Policy	
	Stability analysis of BRRI Varieties **Progress:** Generated of Stability parameters of grain yield	Stability index of BRRI varieties according to seasons
	Improvement of BRRI Stability model by incorporate multiple factors **Progress:** A robust stability model multi-trait stability index (MTSI) employed for incorporating multiple factors	Best model selection for BRRI stability model improvement.
	Development of machine learning model for predicting rice yield loss concerning meteorological features in Bangladesh **Progress:** Assessment and categorize rice yield loss in different seasons in Bangladesh.	Prediction and classification type machine learning model for assessment of rice yield loss in Bangladesh.

	Genotype x Environment interaction of BRRI varieties **Progress:** Seaseon wise analysis were performed	Genotype x Environment Interaction effect of BRRI varieties
	Rice database and analysis system (RDAS) **Progress:** • Used Programming & Scripting Languages for RDAS • R script (3.5.1) For analytical processing • Python (v3.7) For backend processing. • PHP (v7.1) Front end application • Java script (ES2015) For plotting and frontend application Bash Scripting (a series of commands written in a file) For system Integration	Automated informative and user-friendly rice database and analysis system (RDAS)
	Maintenance of Rice and related Database **Progress:** Existing databases have been updated. After necessary correction data were analyzed and uploaded in website, the output was available in BRRI website in different form under different scenarios.	1. Database on rice and related crops. 2. Year wise GR of Rice Production in Bangladesh 3. Database on climatic factors 4. Various climatic maps. Growth rate and trend scenario of area, production and yield of rice in Bangladesh.
	New edition of Simple Lessons from Biometry **Progress:** KGF has agreed to print 500 copies of the new version of the book. We have already incorporated novel experimental designs like the p-Rep, Row-Column, Alpha-design, spatial design, etc., as well as novel analytical techniques in this book. Also, some chapters are included which are essential to the scientists for their modern statistical analysis.	1. Update and publish a new edition of 'Simple Lesion from Biometry' 2. Incorporate novel experimental designs, topics and analytical techniques for various types of data
	Suitability Mapping of BRRI Varieties **Progress:** Agro Edaphic (Based on Soil and Land type) Suitability maps of BRRI dhan101 & BRRI dhan102 have been completed**.**	Suitable and not suitable areas for particular rice varieties.
	Climate Mapping of Temperature and Rainfall on different rice season in Bangladesh	1. Different climatic factors map

	Progress: Maps of maximum temperature, minimum temperature and total rainfall 2022 have been completed. Climatic data for 2023 has been collected from BMD.	of Bangladesh 2. Changing Pattern of climatic factors.
	Season wise rice area mapping of Bangladesh **Progress:** • Rice Area maps of Aman 2023 has been completed. • Projected Climatic Factors (2050) Maps of Bangladesh Projected Precipitation Maps of Bangladesh (July to December month) for 2050 have been completed.	1. Season wise rice cultivated area.
	Suitability Mapping of Various Cropping Pattern **Progress:** 30 Cropping Pattern Suitability Maps have been completed	Suitable and not suitable areas for particular cropping pattern.
	Rice Yield Estimating Using Unmanned Aerial Vehicles (UAVs) Data **Progress:** Data base were prepared as Yield vs Vegetation Indices. Machine Learning Algorithm (ML) already developed for estimated yield by Vegetation Indices by Python in Google Colab platform.	1. Possible to predict yield before harvesting. 2. Save time, money and labor.
	Develop a dynamic web application for visualizing and analyzing the rice disease surveillance data **Progress:** Home page design completed	A dynamic web application for visualizing and analyzing the rice disease surveillance data
	Digitalized Tour Distance Calculation System from BRRI HQ **Progress:** Software design completed	A digital tour distance calculation system for BRRI HQ
	Update the web application to calculate the Stability Index for BRRI Stability Model **Progress:** Software updated	Updated web application to calculate the stability index for BRRI stability model.
	Update the Platform for BRRI Developed Management Information System (MIS)	Updated unique platform for BRRI developed MIS

	Progress: Software updated	
	Digitalized quota management system of BRRI **Progress:** Software updated	Updated digital quota management system for BRRI
	Digitalized salary management system of BRRI **Progress:** Software updated	Updated the digital salary management system of BRRI
	Digitalized labour management system of BRRI **Progress:** Software updated	Updated Labour Management System (LMSV1) of BRRI
	Develop real time AI-based monitoring system for location-specific insect and disease. **Progress**: A new program has taken on 2024-25 by updating the activity of 2023-24 considering smart Bangladesh. So, there has no progress.	• To develop real time AI-based monitoring system for location-specific insect and disease; • To determine disease and insect identifying locations through collecting necessary reports
	Smart profiling of rice varieties for disaster-prone zones of Bangladesh. **Progress**: The app is delivering the detail information of suitable variety for selected areas using 'Select suitable rice variety' menu of 'Rice Profile' mobile app providing desired individual information of division, district and upazilla as input. Already we are including 07 rice type information out of 17 rice type into the mobile app. Also prepared location-specific map using remote sensing and GIS. It has a capacity to develop an easy comparison of the varieties for a specific environment and quickly picking up the preferred one(s). The information of 14 regions under DAE with districts and upazilla of Bangladesh has also included.	• To explore mechanism for profiling rice varieties with respect to environmental suitability, physical and physiological characteristics, yield potential and tolerance to abiotic and biotic stresses; • To electronically present and disseminate the newly developed smart profiled varieties information through a dynamic web application and mobile app to stakeholders;
	Sensor-based rice pest management through Artificial Intelligence (AI) technology of BRRI. **Progress**: Developed this mobile and web application. It's automatically providing the necessary solutions to rice disease and pest related problem with proper management within one to one and	• Time, Cost and Visit (TCV) will be less and quality (Q) will be increased. • Adopt precision agriculture and automations solutions to close rice

	a half minutes through AI and image analysis technology.	yield gaps.
	New version of rice knowledge bank (RKB) mobile Apps *Research Progress*: In this reporting year, we have developed twenty-four mobile-based fact sheets and all fact sheets have been uploaded to the RKB website	1. Disseminate RKB at all regional stations of BRRI as well as in almost all corners of Bangladesh. 2. Extend and update regularly as routine work.
	Develop a new website for BRRI *Research Progress*: Bangladesh Rice Research Institute arranges national and international seminars and symposiums. For this purpose, developed a new website for BRRI, which has been used to get information and submit their papers, abstracts, posters and others.	1. A new website for national and international seminars and symposiums. Domain or sub-domain for the new website.
	"BRRI Alapon" Telephone Directory Mobile App of BRRI. **Progress**: Already database has been developed. All types of data have been collected from divisions, sections and regional stations of BRRI for developing the telephone directory mobile app.	• Digitalize internal communication system to each other of BRRI. • Minimize time, cost and visit (TCV) for sharing instant information using the app.
	Vehicle Requisition Management System of BRRI. **Progress**: The database has already developed and architecture design has been finalized. The information of all vehicle of BRRI (driver's name, mobile no, vehicle reg. no etc.) has been collected from transport section.	• Digitalize Transport division using SMS based VRMS service. • Manage and maintain the VRMS system.
	Training on Innovation, Service Process Simplification (SPS) and e-Nothi system for enhancing capacity of BRRI employee. **Progress**: Day-long 'e-Governance and Vision 2021 & 2041' workshop has already completed on 17 February' 2022 in spite of Covid-19 situation following social distance and health rules. Two day-long 'Public Service Innovation' training has completed on 28-29 May' 2022 at BRRI premises.	• Enrich capacity of BRRI scientists and officers through various PSI and SPS training. • Skills of implementation process will be developed through innovative approach.
	"BRRI Rice Doctor" Apps for BRRI. **Progress**: Developed final version of BRRI rice doctor mobile app and web application. Included	• Manage and maintain rice doctor.

	diagnosis tool technique on BRRI Rice doctor mobile and web application.	
	Strengthening Cyber Security System for BRRI *Research Progress*: 1. We have already designed the architecture of cyber security system of BRRI. 2. Configuration of Virtual Private Network (VPN) is completed successfully.	1. Server will be safe and secured. 2. Data communication will be safe and secured. 3. Virtual Private Network (VPN) connection and tunnel will be developed. Secure remote connection will be developed.
	BRKB Website Management *Research Progress*: 1. Updated with the latest information of Aman, Aus and Boro rice varieties included the latest variety of BRRI dhan106, BRRI dhan105, BRRI dhan104 and BRRI Hybride dhan8. 2. All types of information i.e., soil and fertilizer management, insects and rice diseases management etc. also updated regularly. It is routine work. A total number of 4,50,985 users have been visited the website.	1. Provide more benefit to all users specially farmers, extension workers, researchers etc. 2. Include more information as well as national issues associated with rice production and training.
	BRRI Networks Update, Maintenance and Extension. **Progress**: To build a linkage among all scientists, officers and staffs, where *BRRI Networks* play an important role. At present, more than 35k user like the facebook page of BRRI and 4200 members are joined the 'BRRI Networks' facebook group. It's gradually increasing.	• Store more research related activities post and necessary documents. • Boost and extend the group with adding more members and introducing more new features for noble purpose.
	Dynamic view connectivity system, Bangla searching system and inner banner system for BRKB Website *Research Progress*: 1. Developed a dynamic view connectivity system and inner banner system also integrated into the BRKB website. 2. About 1020 research-related posts have been published in the dynamic view connectivity system and 35,589 uses have been got the service.	1. Dynamic view connectivity system in BRKB. 2. Bangla searching system in BRKB. 3. Inner banner system in BRKB.

	Developed the Bangla Searching system in BRKB. Now anyone can search using both Bangla and English content.	
	BRRI Web Mail and Group Mail ***Research Progress***: 1. Updated the BRRI mail server from 8.8.15_GA_4372 FOSS version to 8.8.15_GA_4545 version. Now our mail server is more secure than the previous one. 2. Provided 110 webmail related solutions in this reporting year. 3. Created individual e-mail id into BRRI domain for all scientists and all officers as per requirement of the Ministry of Agriculture (MoA).	1. Create web mail ID and group mail as per requirement of BRRI scientists and officer's usage. 2. Manage, maintain and update regularly web mail ID, password and group mail for security purpose.
	Developing secure system for BRRI Web Mail and Group Mail ***Research Progress***: About 102 webmail users have created heavy spamming, AACS has detected those users and also blocked them so, the whole system has been saved from the block of Gmail, yahoo, webmail or others e-mail server. SFS has scanned about 102 webmail accounts and solved all problems.	1. Spamming filtering system (SFS) in BRRI web mail and group mail. 2. Automatic active & close system (AACS) in BRRI web mail and group mail. 3. Secure Sockets Layer system in BRRI web mail and group mail.
	LAN and internet connectivity of BRRI regional station(R/S) ***Research Progress***: 1. Established Local Area Network (LAN) connectivity at five regional stations i.e. Sonagazi, Cumilla, Rangpur, Barishal and Habigonj. Increased 2 Mbps full duplex, dedicated and 3.5G (3.5 Generation) internet bandwidth at four regional stations. At present, we have increased the internet speed of sonagazi from 2 Mbps to 7 Mbps.	1. Manage and maintain Internet connectivity of BRRI regional station 2. Manage and maintain local Area Network of BRRI regional station.
	BRRI Web Portal Management ***Research Progress***: 1. Updated more than 1365 (one thousand three hundred and sixty-five) pages and uploaded more than 6643 (six thousand six hundred and forty-three) documents like PDF, JPG, report, Word and other files on the BRRI website. 2. Developed BRRI writer's pool, Rice pest corner and many more.	1. New features for BRRI web portal. 2. To increase hosting spaces gradually

	3. Included the rice database, climate database, etc. on BRRI dynamic website and updated it regularly.	
	Management of BRRI HQ Local Area Network and Internet Connectivity ***Research Progress***: 1. Agricultural Statistics Division have increased our Digital Data Network (DDN) bandwidth connectivity from 157 Mbps to 177 Mbps. Also, established a redundant internet line from BdREN (bandwidth from 100 Mbps to 120 Mbps). Now our internet speed is faster than previous once.	1. High speed internet connectivity for BRRI. 2. Secure Local Area Network for BRRI.
	Personal Data Sheet of BRRI ***Research Progress***: 1. Version 4 of PDS has been developed. 2. All data of Version 1 has been transferred to Version 4. PDS database is updated regularly with latest information. It is a routine work.	Creating Personal Data Sheet (PDS) database including various information fields for all scientists, officers, stuffs as per requirement of the Ministry of Agriculture (MoA).
	Video Conference System of BRRI (skype system) ***Research Progress***: 1. Established video conferencing system at BRRI to communicate with MoA and others government organization. The communications between BRRI headquarter and other's regional station have been conducted by Video Conference System in every monthly co-ordination meeting, ADP meeting, Thursday Seminar and other types of meeting.	1. Creating Skype account for all scientists.
	New version of management Information System (MIS) of BRRI ***Research Progress***: 1. Ten workshops have been completed at Bangladesh agricultural research council (BARC). 2. Feedback workshop has been completed. Tender documents have been prepared.	1. Establishing e-Governance. 2. Setup management information system at BRRI
	Rice Pest Corner ***Research Progress***:	1. Web Application for Rice Pest Corner to identify timely pest problems in rice and control to

	Developed 'Rice pest corner' with the information of insect and pest and disease management. It has been developed for farmers, extension workers, scientists, researchers, teachers, students and other users who want to learn and control insect and disease and other problems that can occur in rice.	manage them.
	Heritage of BRRI. *Research Progress:* 1. Developed Heritage for all scientists, officers, staffs, and workers of BRRI as per requirement of the BRRI authority. 2. Developed individual webpage including picture of all scientists, officers, staffs and workers of BRRI. Heritage is updated regularly. It is a routine work.	1. Managing and maintaining BRRI heritage. 2. Adding all ex. Scientists, ex. officers and ex. Stuffs in BRRI heritage.
	Farm Management Division	
	Program Area: Socio-Economics and Policy	
	3.1 Project: Rice production management	
1.	**Expt. 1. Influence of different dates of transplanting on growth, yield performance and quality of fine rice varieties** **Treatments:** | **Factor A: Transplanting date**	**Factor B: Variety**
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T_1 = 1 July	V_1 = BRRI dhan34
T_2 = 15 July	V_2 = BRRI dhan90
T_3 = 30 July	V_3 = Binadhan-13
T_4 = 15 August	
T_5 = 30 August	
T_6 = 15 September	| **Progress:** In T. Aman 2023 season, 30 July to 15 August transplanting plants produced statistically identical yield of tested fine rice varieties and grain qualities data are being processed.	15 to 30 August transplanting might be produced better yield for fine rice variety.
2.	**Expt. 2. Effect of storage time in different storage technologies on quality of rice** **Treatments:** | **Factor A: Storage time**	**Factor B: Storage container**
---|---|	All storage technologies gave higher germination% and seedling vigor index% at 3 months storage time

T$_1$= Milling after immediate of harvesting	C$_1$ = Plastic container
T$_2$= Milling after 3 months	C$_2$= Jute sacks
T$_3$= Milling after 6 months	C$_3$= Plastic bag
T$_4$= Milling after 9 months	C$_4$ = Motka
	C$_5$ = Grain Pro bag

Progress: The experiment was conducted during Boro 2023. The results of Boro 2023 grain quality data are being processed.

No.	Experiment	Remarks
3.	**Expt. 3. Effect of nitrogen levels on protein quality of rice at different regions** **Treatments:** 	In different N levels: 100 Kg N ha^{-1} fertilizer was used in T. Aman season at different regions to ensure maximum grain yield.

N fertilizer levels (Kg/ha in T. Aman season)	N fertilizer levels (Kg/ha in Boro season)
T$_1$ = No N	T$_1$ = No N
T$_2$ = 50	T$_2$ = 100
T$_3$ = 75	T$_3$ = 125
T$_4$ = 100	T$_4$ = 150
T$_5$ = 125	T$_5$ = 175

Progress: Results of T. Aman 2023 are being processed.

No.	Experiment	Remarks
	3.2. Project: Labor Management System	
4.	**Expt. 2.** Monitoring labor wage rate at different locations of Bangladesh **Progress:** Data of T. Aman season has collected and is being under process. The highest labour wage rate Tk 650-750 day^{-1} was found in the month of July-August due to peak period for harvesting and post -harvesting of Aus and transplanting of T. Aman rice.	The average laborers' wage rate varies from Tk.550-650 day^{-1} in different regions of the year.
	3.3. Project: Rice Seed Production	
5.	**Expt. 3.** Performance of BRRI varieties in seed production plots during 2023-24 **Progress**: Data of T. Aman season has been collected and is being under process. Also, collection of Boro season data is going on. In T. Aman season, BRRI dhan103 produced the highest grain	Actual yield of a variety will be obtained in farm.

	yield (5.92 tha^{-1}) followed by BRRI dhan87.	
	Expt. 2. TLS and Breeder seed production of different rice varieties during 2023-24 In total 4615 kg TLS and 3320 kg breeder seed was produced in T.Aman season under the supervision of Farm Management division.	This finding may be useful for the rice growers and researchers.
	Adaptive Research Division	
1	**Technology validation**	
	Title - ALART, Superior High Yielding Rice-1 (SHR-1) in T. Aman 2023.	
1.1	**Genotype/variety:** Two advanced lines i.e., V1= BRH13-2-14-2-1B and V2= BR13-7-9-3-2B were evaluated along with BRRI dhan49 as during T. Aman 2023. **Locations:** Kushtia (Sadar), Gazipur (WB), Patuakhali (Sadar), Bogura (Sadar), Rangpur (Mithapukur), Satkhira (Sadar), Sonagazi (Feni), Cumilla (Burichang), Gopalganj (Sadar) and Rajshahi (Godagari) Both the advanced lines V1= BRH-13-2-14-2-1B and V2= BR-13-7-9-3-2B produced 3.99 and 3.88 t/ha respectively which is statistically similar with the check variety BRRI dhan49 (4.08 t/ha), but numerical lower than the check variety, therefore both the advanced lines failed to perform better over the check variety BRRI dhan49.	Considering yield, disease and insects reactions, phenotypic acceptance, uniformity of flowering and maturity and farmers' preference none of the advanced lines found suitable for PVT.
	Title - ALART, Superior High Yielding Rice-2 (SHR-2) in T. Aman 2023	
1.2	**Genotype/variety:** Two superior high yielding rice (SHR) advanced lines i.e., V2= BR9396-6-2-2B and V1=BRH9392-6-2-1-3-4 developed by Plant Breeding Division were evaluated against the check varieties BRRI dhan94 during Aman 2023. **Location:** eleven different locations of the country such as Rajshahi (Godagari), Cumilla (Burichang), Barishal (Bakerganj), Sonagazi (Feni), Bogura (Sadar) Gopalganj (Sadar), Ranjpur (Mithapukur), Kushtia (Sadar), BRRI Gazipur (HQ) and Satkhira (Sadar) Among the genotypes highest mean grain yield (4.91tha-1) was obtained in V1=BRH9392-6-2-1-3-4 followed by V2= BR9396-6-2-2B (4.74) and V3= BRRI dhan94(ck) (4.71) Compared to standard checks the mean growth duration of lines BRH9392-6-2-1-3-4, BR9396-6-2-2B (4.74).	Considering Grain yield, Growth duration and Grain size phenotypic acceptance, uniformity of flowering and maturity and farmers' preference none of the advanced lines found suitable for PVT.
	Title -ALART, Antioxidant Rice in T. Aman 2023.	

1.3	**Genotype/variety:** Kushtia (Sada), Jessore (Sarsha) Cumilla (Burichang), Barishal (Sadar), Sonagazi (Feni), Gopalganj (Sadar), Rangpur (Sadar), Bogura (Sadar) Kushtia (Sadar), Rajshahi (Godagari), BRRI Gazipur (HQ)	Considering the above results and phenotypic acceptance, grain type, disease reaction, insect infestation, lodging tendency, and farmers' opinion, none of the advanced lines was found suitable for PVT.
	Title -ALART, Deep water Rice (DWR) in B. Aman 2023.	
1.4	**Genotype/variety:** Two advanced lines bred for deep flooded (1 to 2meter water depth) condition i.e., V1= BR10230-7-19-2B, V2= BR9392-6-2-1B with V3= Fulkori (ck.) and V4=Local popular variety (local check) as checks were tested during B. Aman 2023. **Locations:** Faridpur (Sadar), Gopalganj (Moksedpur), Munshiganj (Louhajang), Habiganj (Baniachang), Manikganj (Harirampur), Rajshahi (Tanore), Sirajganj (Tarash 2 trial), BRRI Gazipur (Shibbari Deep water tank) All the tested lines performed better in Faridpur and Gopalganj where the water depth was 65-84cm which was below our expected level. Our desired water depth was 100-150 cm. However, their performance was not good in Rajshahi, Manikgang and Gazipur where the water depth ranges from 70-104 cm in the trial sites where all the advanced lines damaged but check varieties were in good condition which arose the question of elongation capacity. Cumilla and Habiganj experiments were totally flood free	Considering yield potentiality of the advanced lines, none of the advanced line found suitable for PVT.
	Title -ALART, Premium Quality Rice (PQR), in T. Aman 2023-24.	
1.4	**Genotype/variety:** Two advanced lines bred for deep flooded (1 to 2 meter water depth) condition i.e., V1= BR10230-7-19-2B, V2= BR9392-6-2-1B with V3= Fulkori (ck.) and V4=Local popular variety (local check) as checks were tested in nine different locations during B. Aman 2023. **Location**: Faridpur (Sadar), Gopalganj (Moksedpur), Munshiganj (Louhajang), Habiganj (Baniachang), Manikganj (Harirampur), Rajshahi (Tanore), Sirajganj (Tarash 2 trial), BRRI Gazipur (Shibbari Deep water tank) The highest mean grain yield (4.44 t ha-1) was obtained in the advanced line BR8493-3-5-1-P1 which was statically higher than both the check variety BRRI dhan34 (2.98 t ha-1) & BRRI dan70	Not yet harvested.

	(3.84 t ha-1)	
	11 different ALART, Boro trials are conducting in different agro-echological zone of Bangladesh. Crops are at reproductive stage	
2	**Technology Dissemination**	
	Seed production and dissemination program (SPDP) of modern rice varieties	
	Title -SPDP during T. Aus, 2023under GoB	
2.1	No. of SPDP: 58; Area/SPDP: 1bigha Variety name: BRRI dhan98. Location: 29 upzillas of 11 districts (Narsingdi, Netrakona, Mymensingh, Sherpur, Gazipur, Manikganj, Bhola, Cumilla, B. Baria, Gaibandha and Patuakhali).	A total of 39698 kg grains were produced from all demonstrated plots and 4530 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 3235 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 1437 farmers were motivated and showed their interest to cultivate these varieties in the next year.
	Title -Special program of BRRI dhan83 rapid dissemination in Bhola district during B. Aus, 2023	
2.2	No. of SPDP: 6; Area/SPDP: 1 bigha Varieties name: BRRI dhan83. Location: 6 upzillas of Bhola district	A total of 5327 kg grains was produced from all demonstrated plots and 495 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 262 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 131 farmers were motivated and showed their interest to cultivate these varieties in the next year

	Title -Dissemination of broadcast Aus rice variety (BRRI dhan83) in the hill districts as Jhum cultivation during B. Aus, 2023.	
2.3	No. of SPDP: 56; Area/SPDP: 1 bigha Varieties name: BRRI dhan83. Location: 6 upzillas of 3 hilly districts (Khagrachari, Rangamati, Bandarban).	A total of 28087 kg grains was produced from all demonstrated plots and 3956 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 2689 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 1051 farmers were motivated and showed their interest to cultivate these varieties in the next year.
	Title -Seed production and dissemination program (SPDP) during T. Aus 2023 in the Valley of the Hill districts	
2.4	No. of SPDP:18; Area/SPDP: 1 bigha Varieties name: BRRI dhan98. Location: 6 upzillas of 3 hilly districts (Khagrachari, Bandarban and Rangamati.	A total of 9539 kg grains was produced from all demonstrated plots and 880 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 658 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 283 farmers were motivated and showed their interest to cultivate these varieties in the next year.
	Title -Special program of BRRI hybrid dhan7 rapid dissemination in the different locations of Bangladesh in T. Aus, 2023.	
2.5	No. of demonstration: 35; Area/SPDP: 1 bigha Varieties name: BRRI hybrid dhan7. Location: 28 upzillas of 12 districts (Chattagram, Khagrachari, Bandarban, Rangamati, Borguna,	A total of 43266 kg grains was produced from all demonstrated plots. Farmers did not retain quality seeds by

	Manikganj, Gazipur, Pirojpur, Jhalokathi, Patuakhali, Bhola and Gaibandha)		the farmers as seed for the next year cultivation. About 2214 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 1044 farmers were motivated and showed their interest to cultivate these varieties in the next year.
	Title -Seed production and dissemination program (SPDP) during Aman 2023		
2.6	No. of demonstration: 735; Area/SPDP: 2 bigha Varieties name: BRRI dhan52, BRRI dhan71, BRRI dhan75, BRRI dhan76, BRRI dhan78, BRRI dhan79, BRRI dhan80, BRRI dhan87, BRRI dhan90, BRRI dhan93, BRRI dhan94, BRRI dhan95 and BRRI dhan103 Location: 25 upzillas of 15 districts (Bandarban, Rangamati and Khagrachari)		A total of 402695 kg grains was produced from all demonstrated plots and 55166 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 26760 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 9192 farmers were motivated and showed their interest to cultivate these varieties in the next year. BRRI dhan103, BRRI dhan78, BRRI dhan94 and BRRI dhan95 were highly preferred by the farmers for its higher yield. BRRI dhan95 was also specially preferred by the farmers for its higher paddy production, good taste, quality grain and shorter life cycle that create opportunity to timely establishment of Rabi crops. Therefore, they were motivated to cultivate this variety
	Title -Special dissemination program on BRRI hybrid dhan4 and BRRI hybrid dhan6 in the different locations of Bangladesh in Aman, 2023		

2.7	No. of SPDP: 56; Area/SPDP: 1 bigha Variety: BRRI hybrid dhan4 and BRRI hybrid dhan6 Location: 28 upazilas of 12 districts (Tangail, Gazipur, Narshingdhi, Manikganj, Kishoreganj, Netrokona, Mymensingh, Sherpur, Gaibandha, Bagerhat, Cox's Bazar and Satkhira).	A total of 42209 kg grains was produced from all demonstrated plots. About 2157 farmers acquired awareness and gained knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 843 farmers were motivated and showed their interest to cultivate BRRI hybrid dhan4 and 6 in the next year.
	Title -Seed production and dissemination program (SPDP) during T. Aman 2023 in the Valley of the Hill districts	
2.8	No. of demonstration: 18; Area/SPDP: 1 bigha Varieties name: BRRI dhan80, BRRI dhan87 and BRRI dhan103 Location: Khagrachari, Rangamati and Bandarban	Total grain production of BRRI dhan80, BRRI dhan87 and BRRI dhan103 were 2825 kg, 22136 kg and 12610 kg respectively. The retained seeds by the participant and associated farmers of BRRI dhan80, BRRI dhan87 and BRRI dhan103 were 195 kg, 1681 kg and 1101 kg respectively. A total of 37571 kg grains was produced from all demonstrated plots and 2977 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 1424 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 725 farmers were motivated and showed their interest to cultivate these varieties

		in the next year. All the varieties like BRRI dhan80, BRRI dhan87 and BRRI dhan103 were highly preferred by the farmers for its higher yield. Therefore, they were motivated to cultivate those varieties
2.9	No. of SPDP: 16; Area/SPDP: 1 bigha Varieties name: BRRI dhan75 and BRRI dhan103 Location: 8 upazila of 4 districts (Gazipur, Netrakona, Mymensingh, Tangail, Kishoreganj, Chuadanga, Jhenidah, Khulna, Bagura, Gaibandha, Narsingdhiand Bandarban).	Total grain production of BRRI dhan75 and BRRI dhan103 were 4685 kg and 5184 kg respectively. The retained seeds by the participant and associated farmers of BRRI dhan75 and BRRI dhan103 were 1592 kg and1859 kg respectively. A total of 98691 kg grains was produced from all demonstrated plots and 3451 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 665 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 232 farmers were motivated and showed their interest to cultivate these varieties in the next year. All the varieties like BRRI dhan75 and BRRI dhan103 were highly preferred by the farmers for its higher yield. Therefore, they were motivated to cultivate those varieties (Table 30).
	Title -Seed Production and Dissemination Program (SPDP) during T. Aman, 2023 under TRB	
2.10	No. of demonstration: 30; Area/SPDP: 1 bigha Varieties name: BRRI dhan71, BRRI dhan75, BRRI dhan87, BRRI dhan94 and BRRI dhan95	A total of 31190 kg grains was produced from all demonstrated plots

	Location: 20 upazilas of 8 districts (Gazipur, Netrakona, Mymensingh, Tangail, Kishoreganj, Chuadanga, Jhenidah, Khulna, Bagura, Gaibandha, Narsingdhi and Bandarban)		and 6133 kg quality seeds were retained by the farmers as seed for the next year cultivation. About 1264 farmers acquired awareness and knowledge about the varieties through field visits, discussion and knowledge sharing. A total of 613 farmers were motivated and showed their interest to cultivate these varieties in the next year. All the varieties like BRRI dhan95, BRRI dhan87 and BRRI dhan71 were highly preferred by the farmers for its higher yield. Therefore, they were motivated to cultivate those varieties
	519 demonstrations are conducting at farmer's field during Boro 2023-24 each of which are three bigha. Crops are at reproductive phase.		
3	**Promotional Activities**		
	Title - Farmers' Training on Rice production technology		
3.1	ARD conducted 40 farmer's training under GoB and PARTNER project at different locations of the country.		A total of 1200 trainees were participated Farmers' training during the reporting period of 2023-24. They were trained up and updated their knowledge and skill on modern rice technologies.
	Title - Field day		
3.2	ARD conducted 18 field days at different locations in different seasons of the country under PARTNER project.		Around 1800 participant's including farmers, local leaders and DAE personnel were participated in the field days. These programs also generated much enthusiasm about modern rice

		production technologies and BRRI varieties which helped rapid dissemination of technologies.
	Training Division	
	Program Area: Technology Transfer	
	1. Technology Transfer through training	Knowledge and skill of the trained personnel of the subject matter will be increased.
	1.1 Two months Rice Production Training for BRRI Scientists Participants: BRRI Scientist No. of participants: 30 Duration: 1- months Batch: 01 Progress: Completed	Trained scientists could able to identify and solve problems of rice cultivation. Capable to do research planning, program development and report writing. They can also understand the present and future challenges of rice research and prepared themselves accordingly.
	1.2. Training on Modern Rice Production Technologies for SAAO (Yield maximization) Participant : SAAO (DAE) No. of participants: 400 Duration: 1 week Batch: 16 Progress: Completed	Trained SAAO will be able to identify and solve field problems of rice cultivation and help the farmers to increase productivity.
	1.3. Training on research data management using spread sheet Participant: BRRI Scientists No. of participants: 30 Duration: 1 week Batch: 01 (Completed)	Knowledge of the participant's on data management will be enriched.

	1.4. Training on advance research data management using R Participant : BRRI Scientists No. of participants:30 Duration: 1 week Batch: 01 (Completed)	Knowledge and skill of the participants on scientific article writing will be enriched
	1.5. Training on bioinformatics Participant : BRRI Scientists No. of participants: 30 Duration: 10 days Batch: 1 (Completed)	i. Knowledge of the trained participants about the fundamentals of bioinformatics will be enriched and ii. Enhanced the capacity of the participants to analyzed the biological data.
	Regional Station, Sirajganj	
1.	Long-term missing element trial at BRRI R/S Sirajganj	Started from T. Aman 2023. We didn't find any difference during T. Aman season. Boro 2023-24 is on going
2.	Suitability of latest BRRI varieties in T.Aman-Mustard-Boro cropping pattern	BRRI dhan103 gave higher yield and mustard could be sowing on time. Boro 2023-24 is on going
3.	Scheduling of Phosphetic fertilizer on the growth of Algae and yield of rice	We didn't find any difference during T. Aman season. Boro 2023-24 is on going
	Regional Station, Cumilla	
	1. Program Area: Varietal Development	
1	ALART-FBR-LD	Harvesting is going on, all materials of these trials are in hard dough to maturity stage
2	ALART-PQR	

3	ALART-FBR-SD	
4	ALART-BB & Blast	
5	ALART-BB	
6	ALART (FBR –Bio)	
7	RYT#2 (MD)-FBR	
8	ALART-Zira Type	
9	ALART-Katari Type	
10	Hyb_1st_Set	
11	RYT#3 (SMD)-FBR	
12	ALART (STR-SD)	
13	RYT#4 (ELS)-FBR	
14	Hyb_2nd _Set	
15	RYT#1 (SD)-FBR	
16	RYT#1 (STR)	
17	Hyb_3rd _Set	
18	OYT-(IRR)	
19	RYT#1 (BB & Blast)-MK	
20	AYT-(IRR)	
21	RYT– (Bio) FBR	
22	PYT(IRR)	
23	F1 Confirmation	
24	AGGRi + Purple	
25	OYT (Cum)	
26	AYT (Cum)	
27	RYT#2 (Blast)	
28	RYT#3 (Blast)	
29	RYT#4 (Blast)	
30	RYT#5 (Blast)	

31	RYT (Barishal)	
32	OYT (DRR)	
33	AYT#1 (FBR) + Purple	
34	AYT#2 (FBR)	
35	PYT#1 (Cum)	
36	PYT#2 (Cum)	
37	AYT#3 (FBR) + Purple	
38	RYT#1 (PQR)	
39	RYT#2 (PQR)	
40	RYT#3 (PQR)	
41	RYT (BB & Blast)-MAL	
42	RYT (ZER)	
43	RYT (Fine grain)	
44	G X E (Basmati)	
45	Maintenance Breeding	
46	LST	
47	RGA (F2-F6)	
	2. Program Area: Pest Management	
1.1	Survey and monitoring of major rice diseases in Cumilla district	Management of major rice disease will be developed for increasing rice production and ensure food security
1.2	Demonstration of rice neck blast disease management technology under farmer's field condition	
1.3	Varietal reaction and recovering ability of BRRI released rice varieties	
1.4	Validation of Rice Tungro disease management technology from seedbed in Cumilla region	
1.5	Tracking the infection source(s) of rice false smut disease	
1.6	Evaluation of new chemicals against Blast disease of rice	
1.7	Evaluation of new chemicals against Sheath blight disease of rice	
1.8	Multi-Location Trial (MLT) of blast resistant advanced lines	

1.9	Evaluation of tungro resistant advanced lines in hot spot areas in Cumilla region	
1.10	Evaluation of direct seeded rice for less infection of tungro disease in hot spot area in Cumilla	
1.11	Advisory services to the farmers	
	3. Program Area: Crop-Soil-Water management	
3.1	Effect of nursery management on the performance of rice variety grown under water stagnant condition.	Healthy seedling raising techniques will be identified under stagnant conditions; The Response of BRRI dhan98 at various seedling age and fertilizer management could be explored; Appropriate fertilizer rate and time of planting on new rice varieties will be determined; Suitability of Low land rice in stagnant condition will be developed.
3.2	Effect of seedling age and fertilizer management on growth and yield of rice variety.	
3.3	Effect of time of planting on growth and yield of BRRI developed new T. Aman and Boro varieties.	
3.4	Effects of Potassium fertilization at different growth stages on growth and yield of rice.	
3.5	Long-term missing element trials for diagnosing the limiting nutrient in soil in BRRI R/S Cumilla	
3.6	Effects of N rates on the yield of BRRI released news varieties in BRRI Cumilla	
3.7	Effects of P rates on the yield of BRRI released new varieties in BRRI Farm Cumilla	
3.8	Effects of K rates on the yield of BRRI released new varieties/ advanced lines in BRRI Farm Cumilla	
3.9	Determination of appropriate time of DAP application to control Algal growth	
3.10	Effect of DAP and urea rates on growth and yield of rice	
	4. Program Area: Socio Economic and Policy	
4.1	Stability analysis of BRRI released rice varieties	Stability and suitability of BRRI released rice varieties will be determined in greater Cumilla region

	5. Program Area: Technology Transfer	
5.1	Field demonstration of different BRRI released new rice varieties in Cumilla region (GoB, PPNB, TRB)	Variety/ technology dissemination and awareness build up for increasing rice yield as well as food security
5.2	Farmer's and SAAOs training on modern rice cultivation and disease management technology (PPNB/GoB)	
5.3	Field day on modern rice cultivation (GoB & PPNB)	
	Regional Station, Gopalganj	
1.	Collection of local rice landraces from Faridpur and Khulna region of Bangladesh	A total of 38 Aman rice germplasm was collected from the Faridpur and Khulna region
2.	Rejuvenation of local rice germplasm from Faridpur and Khulna region	A total of 239 Aman rice germplasm were rejuvenated to increase the seed for further evaluation and utilization.
3.	Morphological characterization of newly collected Aman rice germplasm	The present study exhibits high variability in most of the observed traits of Aman rice germplasm. Cluster analysis indicated that the 48 Aman rice germplasm could be divided into three categories. A maximum of 34 entries were grouped into Cluster II and 7 in Cluster III. Cluster I contained the seven number of genotypes.
4.	Developing high-yielding homozygous lines from cultivated popular Hybrid rice varieties through FRGA	In T. Aman season, eight hybrid rice varieties were advanced in F_2-F_3 generations using the FRGA technique
5.	Breeding for developing high-yielding shallow flooded Deepwater/Stagnation tolerant rice varieties (Hybridization)	A total of 32 crosses were made using 10 parents in T. Aman 2023
6.	Advanced Line Adaptive Research Trial (Swarna type) during T. Aman 2023	Two advanced lines BRH9392-6-2-1-3-4, and BR9396-6-2-2B along with

		BRRI dhan94 as check were tested at the farmer's field. One advanced line BRH9392-6-2-1-3-4 gave an average higher yield (6.63 t ha^{-1}) than the standard checks BRRI dhan94 (5.89 t ha^{-1}).
7.	Advanced Line Adaptive Research Trial (DWR type) during T. Aman 2023	Two advanced lines (BR10230-7-19-2B and BR9390-6-2-1B) along with Fulkori and Devmoni as checks were grown at Neemtala, Haridaspur, Gopalganj sadar during T.Aman 2023. Advanced line BR9390-6-2-1B gave an average higher yield (1.94 t ha^{-1}) than the standard checks namely Fulkori and Devmoni
8.	Advanced Line Adaptive Research Trial (Anti-oxidant) during T. Aman 2023	Two advanced lines BR12836-4R-63, BR12836-4R-312 along with BRRI dhan34 and BRRI dhan70 as checks were tested at the farmer's field. One advanced line BR12836-4R-312 (5.03 t/ha) produced a similar grain yield than the check BRRI dhan70 (5.00 t/ha) and It also gave higher yield(5.03 t/ha) than another check BRRI dhan34 (3.65 t/ha).
9.	Regional Yield Trial (RYT-Zira type) during T. Aman 2023 at BRRI farm, Gopalganj	One Advanced line BRH11-7-17-10B gave an average higher yield (5.10 t./ha) than the standard checks namely BRRI dhan62 and Zirasail (4.33-4.43 t/ha).
10.	Regional Yield Trial (RYT-Katari type) during T. Aman 2023 at BRRI farm, Gopalganj	Three advanced lines BRH9-3-14-2B, BRH13-9-5-2B, BRH9-3-2B along

		with Katari as check were tested at the BRRI farm, Gopalganj. Two advanced lines gave a higher yield (5.03-5.07 t ha^{-1}) than the standard check Katari (4.37 t ha^{-1}) with similar growth durations.
11.	Regional Yield Trial (RYT-Tall type) during T. Aman 2023 at BRRI farm, Gopalganj	None of the test entries out yielded than the check variety BRRI dhan76 (4.27 t/ha).
12.	Regional Yield Trial (RYT-STR-1) during T. Aman 2023 at BRRI farm, Gopalganj	Twelve (12) advanced breeding lines along with two checks BRRI dhan73 and BRRI dhan87 were tested. Two advanced lines BR13118-4R-76 and BR13106-4R-438 (5.20-5.33 t/ha) produced a similar grain yield than the check BRRI dhan73 (5.20 t/ha) but lower than the check BRRI dhan87.
13.	Regional Yield Trial (RYT-STR-2) during T. Aman 2023 at BRRI farm, Gopalganj	Sixteen (16) advanced breeding lines along with three checks BR23, BRRI dhan73, and BRRI dhan87 were tested. One advanced breeding line BR13117-4R-95 gave a higher yield (5.90 t/ha) than all checks.
14.	Regional Yield Trial (RYT-Photosensitive) during T. Aman 2023 at BRRI farm, Gopalganj	Eight advanced breeding lines along with two checks BR23 and BR22 were tested. One advanced line BR10212-17-3-2-2 produced a higher yield (5.10 t/ha) than all checks.
15.	Regional Yield Trial (RYT-Low Amylose) during T. Aman 2023 at BRRI farm, Gopalganj	Two advanced breeding lines along with two checks BRRI dhan71 and BRRI dhan87 were tested. None of the test entries yielded other than the check

		varieties.
16.	Regional Yield Trial (PYT-DWR) during T. Aman 2023 at BRRI farm, Gopalganj	Eight local deep-water rice (DWR) genotypes along with check BRRI dhan91 were tested. Two local DWR Devmoni and Jabra (2.77-2.96 t/ha) produced a similar grain yield than the check BRRI dhan91 (2.73 t/ha)
	Boro 2023-24	
	Boro- ALART	Seven ALARTs have been harvested and Data collection is on going
	Boro- RYT	Nine RYTs have been harvested and Data collection is ongoing.
	Regional Station, Sonagazi	
	Season: Aus 2023-2024	
1	**Program Area: Varietal Development**	
1.1	Pure line selection	Development of high yielding (6 to 7 t/ha) Aus variety with good grain quality for Chattogram and Rangamati regions
2	**Program Area: Pest Management**	
2.1	Reduction of insecticide use in rice production for safe food production	Minimum use of insecticide to safeguard for food production.
3	**Program Area: Crop-Soil-Water management**	
3.1	Optimizing seedling age of dibbled field for transplanting at saline Charland	Appropriate fertilizer rate and time of planting on new rice varieties will be determined; Suitability of rice in saline condition will be developed, Potassium and nitrogen rate will be identified in southern region.

3.2	Nitrogen management in transplanting Aus rice using splitted tillers from dibbled field	
	Program Area: Socio Economic and Policy	
4.1	Stability analysis of BRRI released rice varieties	Stability and suitability of BRRI released rice varieties will be determined in the southern region.
	Program Area: Technology Transfer	
5.1	Adaptive Trials of PQR varieties (PQR-KGF project) 1. Validate the adaptability of modern rice varieties at different rice environments 2. Investigate the performance of newly released varieties compared to popular old mega variety 3. Select suitable variety(s) for target environments	Suitable variety(s) for target environments
5.2	Demonstration of Modern Rice Varieties: Total 990 in 990 bigha) Aus: 210 bigha (Karmasuchi) To demonstrate and disseminate BRRI varieties in greater Chattogram and Rangamati regions.	Rapid dissemination of newly released rice varieties to the farmers
5.3	Farmer's and SAAOs training on modern rice cultivation and disease management technology Total: 20 (GoB & Partner)	To increase farmers/SAAOs/Officers knowledge
5.4	Field day on modern rice cultivation (GoB &Karmasuchi) Total: 10	To increase farmers knowledge
5.5	Breeder seed production	Produce breeder seeds for further seed multiplication. Enrich seed stock of modern rice varieties.
5.6	TLS/Quality seed production 1 hacter	Utilize quality seed for conducting Research and Demonstration. Provide seeds to different stakeholders to enhance dissemination of modern rice varieties.
	Season: Aman 2023-2024	
	Program Area: Varietal Development	
1.1	Hybridization	Development of photosensitive variety

		with higher yield (7.0 t/ha), slender grain, lodging tolerance for Chattogram and Rangamati regions
1.2	Confirmation of F_1	do
1.3	Backcross breeding	do
	Program Area: Pest Management	
2.1	Survey and monitoring of major rice insects in Sonagazi district	Find out the prevalence of Major rice insects
2.2	Reduction of insecticide use in rice production for safe food production	Minimum use of insecticide to safeguard for food production
	Program Area: Crop-Soil-Water management	
3.1	Effect of planting date on the performance of modern rice varieties at southeast Bangladesh	Appropriate time of planting on new rice varieties will be determined
	Program Area: Socio Economic and Policy	
4.1	Stability analysis of BRRI released rice varieties	Stability and suitability of BRRI released rice varieties will be determined in the southern region.
	Program Area: Technology Transfer	
5.1	Adaptive Trials of PQR varieties (PQR-KGF project) Demo=60	1. Validate the adaptability of modern rice varieties at different rice environments 2. Investigate the performance of newly released varieties compared to popular old mega variety 3. Select suitable variety(s) for target environments
5.2	Demonstration of Modern Rice Varieties: Total 990 in 990 bigha) Aman: 60 bigha, Aman: 60 bigha (TRB Project), Aman: 60 bigha (PQR Project) Aman: 240 bigha, (GOB/Karmasuchi).	Rapid dissemination of newly released rice varieties to the farmers
5.3	Farmer's and SAAOs training on modern rice cultivation and disease management technology	To increase farmers/SAAOs/Officers

	(GoB & Partner) Total: 40	knowledge
5.4	Field day on modern rice cultivation (GoB &Partner) Total:20	To increase farmers knowledge
5.5	Breeder seed production 5 hacter	Produce breeder seeds for further seed multiplication. Enrich seed stock of modern rice varieties.
5.6	TLS/Quality seed production 3 hacter	Utilize quality seed for conducting Research and Demonstration Provide seeds to different stakeholders to enhance dissemination of modern rice varieties.
	Season: Boro 2023-2024	
1.	**Program Area: Varietal Development**	
	none	
	Program Area: Pest Management	
2.1	Survey and monitoring of major rice insects in Sonagazi district	Find out the prevalence of Major rice insects
2.2	Reduction of insecticide use in rice production for safe food production	Minimum use of insecticide to safeguard for food production
3	**Program Area: Crop-Soil-Water management**	
3.1	Effect of planting date on the performance of modern rice varieties at southeast Bangladesh	Appropriate time of planting on new rice varieties will be determined
3.2	Determination of potassium rate for saline affected Charland	Appropriate potassium rate will be identified in southern region
3.3	Optimizing Nitrogen rate for Bangabandhu dhan100	Appropriate nitrogen rate will be identified
4	**Program Area: Socio Economic and Policy**	
4.1	Stability analysis of BRRI released rice varieties	Stability and suitability of BRRI released rice varieties will be

		determined in the southern region.
5	**Program Area: Technology Transfer**	
5.1	Adaptive Trials of PQR varieties (PQR-KGF project) Demo=60	1. Validate the adaptability of modern rice varieties at different rice environments 2. Investigate the performance of newly released varieties compared to popular old mega variety 3. Select suitable variety(s) for target environments
5.2	Demonstration of Modern Rice Varieties: Total 990 in 990 bigha) Boro: 60 bigha (Hybrid Rice Project), 60 bigha (PQR Project), 240 bigha (GOB/Karmasuchi).	To demonstrate and disseminate BRRI varieties in greater Chattogram and Rangamati regions.
5.3	Farmer's and SAAOs training on modern rice cultivation and disease management technology (GoB & Partner) Total: 40	To increase farmers/SAAOs/Officers knowledge
5.4	Field day on modern rice cultivation (GoB &Partner) Total: 20	To increase farmers knowledge
5.5	Breeder seed production	Produce breeder seeds for further seed multiplication. Enrich seed stock of modern rice varieties.
5.6	TLS/Quality seed production 5 hacter	Utilize quality seed for conducting Research and Demonstration Provide seeds to different stakeholders to enhance dissemination of modern rice varieties.
	Regional Station, Bhanga	
	Program Area: Varietal development, Farming Systems Research, Crop-soil-water management, Socio economics and Technology transfer	
1.	Breeding for developing high yielding Transplanting Aman rice varieties (Hybridization)	In Aman 2023 season, 6 crosses were

		made and 479 F_1 seeds were produced for developing high yielding transplanting Aman rice varieties with desirable characters with emphasis on water stagnation tolerance, anaerobic tillering, earliness, good grain quality.
2.	Breeding for developing high yielding shallow flooded Deep water rice varieties (Hybridization)	For deep water rice variety development, 6 crosses were made and 359 F_1 seeds were produced with desirable characters with emphasis on kneeing ability, nodal tillering, earliness and awnless good grain quality.
3.	Breeding for developing Anoxia tolerant rice varieties	For developing Anoxia tolerant rice varieties 6 crosses were made and 384 F_1 seeds were produced.
4.	Breeding of high yielding rice varieties for high input responsive in single Boro favorable ecosystem	For developing high yielding rice varieties with high input responsive in single Boro favorable ecosystem 17 crosses and 3 back crosses have been made during current Boro 2023-24 season.
5.	Confirmation of F_1s	18 F_1's was confirmed during Aman 2023 18 F_1's has been confirmed during Boro 2023-24
6.	FRGA	During Aman 2023, around 15000 progenies from 34 crosses of F_2-F_4 generation were grown following Field Rapid Generation Advanced (FRGA) technique and 9624 progenies were harvested.

		In current Boro 2023-24 season, around 14241 progenies from F_2-F_5 generation are being grown in the research field following Field Rapid Generation Advanced (FRGA) technique.
7.	LST (Line Stage Testing)	281 fixed lines were selected from the LST during Aman 2023 focusing on deep water rice development. 141 fixed lines are being evaluated during Boro 2023-24 focusing on developing high yielding rice varieties with high input responsive in single Boro favorable ecosystem
8.	OYT (Observational Yield Trial)	447 fixed breeding lines are being evaluated in OYT during Boro 2023-24
9.	Proposed Variety Trial (PVT) for inbred rice variety, T. Aman 2023 and Boro 2023-24	Three sets of PVT were evaluated during Aman 2023 and 7 (seven) sets of PVT are being evaluated during Boro 2023-24
10.	ALART (Deep Water B. Aman-2023)	One ALART of Deepwater rice was established under the supervision of BRRI Bhanga during B. Aman 2023 season in Talma, Faridpur.
11.	ALART (Boro 2023-24)	During Boro 2023-24 a total of 5 (Five) ALARTs was established under the supervision of BRRI Bhanga. ALART (FBR-LD), ALART (FBR-Bio), ALART (PQR), ALART (FBR-SD), ALART-SHR (Katari type), ALART-SHR (Zira type). Harvesting completed and data collection is going on.

12.	Regional Yield Trial (RYT), B. Aman 2023	One RYT of Deepwater rice was established under the supervision of BRRI Bhanga during B. Aman 2023 season in Talma, Faridpur.
13.	Regional Yield Trial (RYT), Boro 2023-2024	A total of 12 RYTs: RYT_FBR (SD), RYT_FBR (MD), RYT_FBR (SMD), RYT_FBR (ELS), RYT-FBR (Barishal), RYT-STR, RYT-ZER, RYT-Deep water (Tall), RYT-BB and Blast, RYT-Blast (LD), RYT-Blast (MD), RYT-Blast (SD) are evaluated during Boro 2023-24
14.	Advance Yield Trial (AYT)	One AYT on Nitrogen use efficiency is on going in Boro 2023-24
15.	Collection and Characterization of local rice landraces	A total of 10 local landraces have been collected.
16.	Screening and identification of anaerobic germination (AG) tolerance rice germplasm of Bangladesh.	BRRI R/S Bhanga has conducted screening (reconfirmation) using 47 genotypes (26 DSR+17 land race+5 BRRI varieties) in Aman 2023. The reconfirmation result was consistent with the previous screening result. The survivability (%) of the top four genotypes are Shishumoti (72-75%), Lal Aman (64-70%), Khirari (58-67%) and Indrasail (58.3-61.7%).
17.	Effects of planting time on *Aus* rice in Charland area of Faridpur, Bangladesh	Grain yield of BRRI dhan83 planting on 5 April gave significantly higher irrespective of planting time and varieties. BRRI dhan82 and BRRI dhan83 produced higher grain yield compared to local varieties Porangi.

18	Effects of planting time on the performance of Modern BRRI varieties in Faridpur region	On going Boro 2023-24.
19.	Development of weed control techniques in Boro-Fallow-Fallow cropping pattern	On going Boro 2023-24.
20.	Effect of herbicide on Azolla infestation in Faridpur region (On going)	On going Boro 2023-24.
21.	Effect of Trichocompost on nutrient and disease management in rice	On going Boro 2023-24.
22.	Stability of yield of BRRI released Aman varieties	For short duration Aman varieties, BRRI dhan95 and BRRI dhan73 produced 5.44 t ha^{-1} and 5.07 t ha^{-1} than other varieties like BRRI dhan62. In medium duration *Aman* varieties based on yield BRRI dhan72 produced highest grain yield 5.19 t ha^{-1} followed by BRRI dhan103 and BRRI dhan78. In long duration T. Aman varieties BR22 yielded high (3.6 t ha^{-1}) followed by BR10 and BRRI dhan46.
23.	Stability of yield of BRRI released Boro varieties	On going Boro 2023-24.
24.	Evaluation of different Aman rice varieties under Wheat-Jute-T. Aman cropping pattern in Faridpur region	Five newly released BRRI varieties (BRRI dhan71, 75, 87, 103 and BRRI hybrid dhan6) of Aman season were tested against locally popular BRRI dhan39 under Wheat-Jute-T. Aman cropping pattern. Yield of tested rice varieties were ranged from 5.62-5.99 t/ha where BRRI dhan39 (ck) was yielded 4.49 t/ha. In rabi season, yield of wheat was ranged from 4.38-4.51 t/ha. Jute crop is in the field.
25.	Validation of improved cropping pattern technology Boro-Transplanted deepwater Aman in the single Boro area of Faridpur region	Deepwater rice variety Laxmidigha was transplanted in single Boro area and the yield was 1.86 t/ha. Boro rice is in the

		field and data yet to collect.
26.	Fine tuning of the improved cropping pattern technology Lentil + Muskmelon-Jute-T. Aman in Faridpur region	During T. Aman season BRRI dhan71, 75 and Bina dhan-17 were grown and yield was 5.47, 5.52 and 5.10 t/ha, respectively. BARI Mashur-8 was grown during rabi season and the yield was ranged from 1.98-2.14 t/ha. Jute is in the field. After completion of the crop cycle system productivity will be calculated.
27.	Demonstration of modern rice varieties in Aman and Boro seasons in greater Faridpur region	A total of 700 demonstrations (60 demos in T. *Aus*, 140 demos in T. *Aman* and 500 in *Boro* seasons) using modern rice BRRI varieties during T. *Aus*, T. *Aman* 2023 were carried out in different farmers' fields of 24 upazila of 4 districts (Faridpur, Madaripur, Rajbari and Shariatpur) under BRRI RS, Bhanga, Faridpur. Highest yield of different BRRI released modern Aus varieties were: 4.41 t ha^{-1} for BRRI dhan83, 5.05 t ha^{-1} for BRRI dhan98, 5.82 t ha^{-1} for BRRI Hybrid dhan7. Mean grain yields with growth duration of *Aman* varieties were: 4.90 t ha^{-1} with 115 days for BRRI dhan75, 5.32 t ha^{-1} with 127 days for BRRI dhan87, 5.89 t ha^{-1} with 129 days for BRRI dhan103 and 5.90 t ha^{-1} with 118 days for BRRI Hybrid dhan6. In 2023-24 Boro, the harvesting of

		demonstrated Boro varieties is going on.
28.	Head to Head Trial: VRS (Variety Replacement Strategy)	In T. Aman season, 2023, BRRI dhan75 produced highest yield in all locations with growth duration of 113-115 days.
29.	Training	Total 25 training programs where 750 participants consisting of farmers, DAE personnel with the cooperation of DAE under the financial assistance of GOB.
	Regional Station, Barisal	
01	Hybridization (Boro) 24 (On going)	Development of Boro rice variety(s) for favorable ecosystem
02	F1 confirmation (Boro) 24 (On going)	High yielding favorable rice variety development
03	Generation Advancement, F2 (RGA)(Boro) 24 (On going)	High yielding favorable rice variety development
04	Generation Advancement, F3 (Hybrid) (Boro) 24 (On going)	High yielding favorable rice variety development
05	Generation Advancement, F5 (RGA) (Boro) 24 (On going)	High yielding favorable rice variety development
06	Generation Advancement, F7 (Hybrid) (Boro) 24 (On going)	High yielding favorable rice variety development
07	Observational Yield Trial (OYT#1) (Boro) 24 (On going)	High yielding favorable rice variety development
08	Observational Yield Trial (OYT#2) (Boro) 24 (On going)	High yielding favorable rice variety development
09	Preliminary Yield Trial (PYT# 01) (Boro) (On going)	High yielding favorable rice variety development
10	Advanced Yield Trial (AYT-1) FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development

11	Advanced Yield Trial (AYT-2) FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development
12	Advanced Yield Trial (AYT-3) FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development
13	Advanced Yield Trial (AYT-4) FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development
14	Advanced Yield Trial (AYT-5) FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development
15	Advanced Yield Trial (AYT-6 FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development
16	Advanced Yield Trial (AYT-7 FBR (Sagordi) (Boro) 24 (On going)	High yielding favorable rice variety development
17	Advanced Yield Trial (AYT- 8 (NGR) (Boro) 24 (On going)	High yielding favorable rice variety development
18	Advanced Yield Trial (AYT-9) (Boro) 24 (On going)	High yielding favorable rice variety development
19	Hybrid Seed Production (Boro) (On going)	Getting quality hybrid seed
20	Hybridization (T. Aman)	29 crosses made using 15 parents to develop rice varieties adaptive to non saline tidal ecosystem
21	F1 confirmation (T. Aman)	25 F1 genotypes out of 33 were confirmed based on phenotypic observation to develop rice varieties adaptive to non saline tidal ecosystem
22	Preliminary yield trial (PYT) (T. Aman)	6 genotypes were selected out of 16 comparing with 4 standard checks
23	Advanced Yield Trial (AYT-1) (T. Aman)	3 genotypes were selected out of 12 tested entries comparing with 5 standard checks
24	Advanced Yield Trial (AYT-2) (T. Aman)	1 genotype was selected out of 20 tested entries comparing with 4

		standard checks
25	Advanced Yield Trial (AYT-3) (T. Aman)	None of the genotypes was selected out of 9 tested entries comparing with 5 standard checks
26	Exploring sediment deposition from tidal water in Barishal regional station	Measurement of Silt deposition rate and silt properties through tidal water flow in rice field.
27	Effect of time of planting of newly developed BRRI varieties in Barishal region at T. Aman 2023	Fixation of the optimum planting time of newly developed BRRI varieties for getting higher yield.
28	Study on Site Specific and Cost -Effective Integrated Weed Management (IWM) Techniques for Modern Rice Varieties in Barishal Region	Able to identify the cost effective integrated easy and site-specific weed management techniques
29	Suitable varietal combination for Fallow-Aus-T. Aman cropping pattern in Barishal region (Aus)	Land coverage of rice cultivation will be increased using identified suitable cropping pattern in Aus season
30	Ratooning ability of BRRI released Boro rice varieties at Barishal region in Boro-Fallow-T. Aman cropping pattern (Boro)	Identifying potential BRRI released ratoon varieties in Boro season at Barishal region under tidal surge non saline ecosystem along with fertilizer management to increase the productivity at Barishal region.
31	Diversification of a dominant single cropped area (Fallow-Fallow-T. Aman) in Barishal region, Bangladesh. (Aus, Boro)	Cropping intensity will be increased.
32	Upscalling Blast Mangement Practices at Barishal Region	A complete guideline to control Blast by Mangement Practices will be prepared.
33	Evaluation of New Molecules against Blast Disease Management	Identifying effective new molecule (s) against Blast Disease control.
34	Characterization of Blast isolates of Barishal region using differential system	Catagorize blast isolates based of their infection pattern in rice.

35	Healthy seedling raising in tray practices during Boro season	Identifying easy and cost-effective techniques of seedling raising in tray.
36	Survey and Monitoring of Rice disease status at Barishal region	Disease intensity and pattern will be found out.
37	Blast resistant trait discovery among tidal coastal germplasm	Blast resistant germplasm will be identified adaptive to tidal coastal ecosystem.
38	Digitization of Charbadna and Sagordi farm of BRRI R/S, Barishal for converting to SMART farming	Charbadna and Sagordi farm will be digitalized for easy operating of farm activities.
39	Experiment on Stability Analysis of BRRI released modern rice varieties will be conducted in collaboration and cooperation with ASD	Able to find out stable performance of the BRRI released modern rice varieties across the country.
40	Demonstration of Modern Rice Varieties	Promising rice varieties will be disseminated rapidly to the farmers as well as food security will be increased.
41	Field day	Farmers will be inspired and motivated for cultivating HYV rice varieties.
42	Farmers Training on Rice Technology	Farmers' knowledge and skills will be increased on rice cultivation, management techniques, quality seed production and storage.
43	Breeder Seed (BS) Production	Quality seed will be produced for TLS seed production.
44	Truthfully labelled Seed (TLS) Production	Quality TLS seed will be produced in order to supply to the farmers.
	Regional Station, Kushtia	
	Varietal Development program area	
	T. Aus, 2023	
1.	Advanced yield trial (AYT#HDNT)	Breeding line IR18C1002 had

		demonstrated a statistically significant increase in yield compared to BRRI dhan98
2.	Regional yield trial (RYT#BB)	No entry gave statistically higher yield over the check variety, BRRI dhan98
3.	Regional yield trial (RYT#BB-Path)	None of the entries exhibited statistically significant yield improvements over the benchmark variety, BRRI dhan98.
4.	Regional yield trial (RYT#Favorable)	No entry gave statistically higher yield over the check variety, BRRI dhan98
	T. Aman, 2023	
5	Regional yield trial (RYT#AER-1)	None of the entries exhibited a statistically significant increase in yield compared to the check variety, BRRI dhan70.
6	Regional yield trial (RYT#AER-2)	No entry gave statistically higher yield over the check variety, BRRI dhan87
7	Regional yield trial (RYT#DTR)	No entry gave statistically higher yield over the check variety, BRRI dhan71
8	Regional yield trial (RYT#Katari-type)	Two breeding lines, BRH13-9-5-2B and BRH9-3-2B, had shown statistically significant increases in yield compared to Katari.
9	Regional yield trial (RYT#RLR-1)	Breeding line BR12005-6R-14 has demonstrated statistically higher yields compared to Katari.
10	Regional yield trial (RYT#RLR-2)	No entry gave statistically higher yield over the check variety, BRRI dhan87
11	Regional yield trial (RYT#SWR)	None of the entries exhibited a statistically significant increase in yield

		compared to the check variety, BRRI dhan76.
12	Regional yield trial (RYT#ZER)	No entry gave statistically higher yield over the check variety, BRRI dhan87
13	Regional yield trial (RYT#Jira-Type)	No entry gave statistically higher yield over the check variety, Jirashail
14	Regional yield trial (RYT#BB)	None of the entries demonstrated statistically significant yield increases over the check variety, BRRI dhan87.
15	Regional yield trial (RYT#FSR)	The breeding line BR12098-4R-117 had shown a statistically significant increase in yield compared to BRRI dhan75.
16	Regional yield trial (RYT#Low amylose)	No entry gave statistically higher yield over the check variety, BRRI dhan87
17	AGGRi Network trial (Stage-1)	The entry, IR22EL1742 gave statistically higher yield over BRRI dhan95
18	AGGRi Network trial (Stage-2)	The entry IR 132084-B-1191-1-1-B-2 exhibited a statistically significant yield advantage over BRRI dhan95.
	Boro, 2023-24	
19	Regional yield trial (RYT#SD)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
20	Regional yield trial (RYT#MD)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
21	Regional yield trial (RYT#ELS)	Harvesting is currently in progress. One

		or more Advanced breeding lines will be found with higher yielders than checks.
22	Regional yield trial (RYT#BAR)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
23	Regional yield trial (RYT#SD)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
24	Regional yield trial (RYT#Blast-1)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
25	Regional yield trial (RYT#Blast-2)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
26	Regional yield trial (RYT#Blast-3)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
27	Regional yield trial (RYT#Blast-4)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
28	Regional yield trial (RYT#PQR-1)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.

29.	Regional yield trial (RYT#PQR-2)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
30	Regional yield trial (RYT#PQR-3)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
31	Regional yield trial (RYT#ZER-3)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
32	Regional yield trial (RYT#Fine grain)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
33	Regional yield trial (RYT#STR)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
34	Regional yield trial (RYT#BB-Blast)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
35	Regional yield trial (RYT#FBR-Bio)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
36	Regional Yield Trial (RYT)-G×E Interaction of Basmati Rice (On Station)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.

37	Regional Yield Trial (RYT)-G×E Interaction of Basmati Rice (On Farm)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
38	On Farm Trial (OFT)- Salinity Tolerant Rice (OFT#STR)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
39	Advanced Yield Trial (AYT#1)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
40	Advanced Yield Trial (AYT#2)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
41	Advanced Yield Trial (AYT#EMF)	Harvesting is currently in progress. One or more Advanced breeding lines will be found with higher yielders than checks.
42	ALART for Super High-yielding Rice (ALART#SHR-1)	No entry gave statistically higher yield over the check variety, BRRI dhan49
43	ALART for Super High-yielding Rice (ALART#SHR-2)	No entry gave statistically higher yield over the check variety, BRRI dhan94
44	ALART for Antioxidant Enriched Rice (ALART#AER-1)	No entry gave statistically higher yield over the check variety, BRRI dhan70
	Socio-Economics and Policy	
1.	Stability analysis of BRRI varieties (T. Aus, T. Aman and Boro season)	In the Aman season, BRRI dhan87 (short duration), BRRI dhan105 (medium duration) and BR10 (long duration) stand out as the highest

		yielders. Harvesting is currently in progress in the Boro season.
	Crop-soil-water management	
1.	Determination of the optimum time of planting for yield maximization of BRRI dhan87 at the Kushtia region	The optimal planting window for BRRI dhan87 falls between August 7th and 22nd for best growth and yield.
2.	Effect of Missing Nutrient Elements on Growth and Grain Yield of Rice in BRRI Farm, Kushtia	N is the most limiting factor for yield reduction (4.88 t/ha in N omitted plot)
	Rice Farming Systems	
1	Interpolation of Premium Quality and Nutrition-Enriched Rice Varieties in Existing Mustard – Boro – T. Aman Cropping System	In this experiment yield of mustard and T. Aman rice in Farmers' practice (BARI Sorisha-14 (1.32 t/ha) - BRRI dhan28 - BRRI dhan34 / Badshavog (2.40 t/ha) Improved practice-1: BARI Sorisha-14 (1.51 t/ha) - Bangabandhu dhan100 - BRRI dhan90 (4.14 t/ha) and Improved practice-2: BARI Sorisha-14 (1.50 t/ha) - BRRI dhan63* - BRRI dhan90 (4.12). Boro rice is in the field.
2	Increasing the system productivity of the Boro – Fallow - T. Aman cropping pattern through the inclusion of Mustard in the High Ganges River Floodplain	The yield of BARI Sorisha-14 was 1.89 t/ha (with tillage) and 1.49 t/ha (relay) and BRRI dhan87 and BRRI dhan103 was 5.38 and 6.60 t/ha, respectively in proposed cropping pattern Mustard-Boro-T. Aman. Boro rice is on trial.
3	Determination of Optimum Planting Window of Newly Released T. Aman Rice Varieties in Three Cropped Cropping Pattern	BRRI dhan87 (6.71 t/ha) performed better when transplanted at 16th August and yield of rice decreased due to transplanting at later date.
4	Evaluation of different rice-based cropping patterns under agro-forestry systems with exotic date palm (Phoenix dactylifera).	In this experiment the yield of DS Aman (BRRI dhan71) was within the

		range of 3.11 to 3.45 t/ha and mustard was 1.31 t/ha. Other crops data is under processing.
	Technology transfer	
1.	Demonstrations of newly released BRRI varieties	In the Aman season, BRRI dhan71, BRRI dhan75, BRRI dhan87, BRRI dhan90, BRRI dhan103, and BRRI Hybrid dhan6 were demonstrated. The highest yield was observed in BRRI Hybrid dhan6 (6.13 t/ha). BRRI dhan63, BRRI dhan84, BRRI dhan89, BRRI dhan92, BRRI dhan96, and Bangabandhu dhan100 were demonstrated in Boro season. Harvesting is ongoing. BRRI dhan48, BRRI dhan85, BRRI dhan98, and BRRI Hybrid dhan7 are being demonstrated in the ongoing Aus season.
2	Head-to-Head Adaptive Trial	In the Aman 2023 season, BRRI dhan71 demonstrated superior performance with a yield of 5.32 t/ha.
3	Training, Field Day and Workshop	A total of 10 batches of farmer trainings were conducted, engaging approximately 300 farmers. Alongside six field days and one workshop were organized.
	Regional Station, Rajshahi	
1.0	**Varietal Development Program**	
1.1	Hybridization	In Aman, BRRI dhan90/Krishnobhog

			were made to introgress Aroma in BRRI dhan90 In Boro, seven crosses were made to get Jira quality grain.
1.2	List of F1's to be confirmed		555 F1 seeds of 9 crosses were confirmed
1.3	Growing RGA Population		In Aman, 39520 RGA genotype were harvested from 42 crosses. In Boro, 42,000 RGA genotype were transplanted from 46 crosses
1.4	Purification of local Sampa katari through Head to Row		Three categories of local Sampa Katari cultivar were selected
1.5	Regional Yield Trial		In Aman, 16 RYT were conducted and 20 genotypes were selected for further advancement In Boro, about 35 RYT/AYT/OYT are evaluating.
1.6	Collection and maintenance of local landraces		Three local germplasm were collected
2.0	**Crop-soil-water managemet**		
2.1	Validation of agricultural drought forecasting for mitigating drought in T. Aman rice at Rajshahi region		Sufficient rainfall occurred during the T. Aman season 2023. But last part of the reproductive and early of the ripening stages, there was insufficient rainfall occurred in Rajshahi. A good matching was found between observed and forecasted rainfall. Observed and forecasted rainfall were 666 mm and 609 mm, respectively during its growth period from transplanting to harvesting. Observed and forecasted reference crop

		evapotranspiration (ET0) was calculated by using CROPWAT8. Total observed and forecasted ET0 were measured 371.64 mm and 390.62 mm, respectively. Details analysis of the experiment is under processing.
2.2	Irrigation Scheduling of Rice (Oryza sativa L.) based on Weather Forecasting in Rajshahi during Boro season.	Data collection, data processing, and analysis is under processed.
3.0	**Rice Farming System**	
3.1	Improvement of Productivity in Potato-Boro-T. Aman cropping pattern through varietal replacement.	In this experiment, yield of potato and T. Aman rice in existing cropping pattern (BARI alu-8 (24.95 t/ha) - BRRI dhan93 (5.03 t/ha). In Improved practice-1: BARI Alu-25 (25.15) t/ha) – BRRI dhan90 (3.90 t/ha) and Improved practice-2: BARI Alu-25 (25.41 t/ha) - BRRI dhan103 (6.14 t/ha). Boro* rice is in the field.
3.2	Evaluation of three and four cropped cropping patterns for Rajshahi region	The cycle of cropping patterns is not over yet in 2023-24. Boro and aus is in the field and data collection, processing of other crops of the patterns is under processing.
	Regional Station, Satkhira	
	Assessment of specific and general adaptability for selection of suitable hybrid rice genotypes under saline prone areas for boro season	To find out hybrid rice genotypes suitable for saline prone areas for Boro Season
	Line Stage Trial (LST)	To assess FRGA/RGA derived advanced breeding lines for uniformity

		at heading and desirable agronomic and grain type traits
	Observational Yield Trial (OYT)	Identification of genetically fixed advanced lines suitable for saline areas
	Preliminary Yield Trial (PYT)	Initial evaluation of breeding lines for yield and other agronomic characteristics in replicated trial
	Advanced Yield Trial (AYT)	
		Confirmatory evaluation of selected genotypes for yield and other agronomic characteristics
	Regional Yield Trial (RYT)	To evaluate specific and general adaptability of the advance breeding lines with respective check-in on-station condition
	International Rice Soil Stress Tolerant Nursery (IRSSTN)	Evaluation of breeding lines for yield and other agronomic characteristics for saline areas
	Effects of long-term missing nutrients on rice yield	To identify yield limiting nutrients of rice
	Nitrogen rates and varietal effects on rice yield and greenhouse gas emissions in coastal ecosystems of Bangladesh	To assess the effects of rice cultivars and nitrogen doses on rice yield and greenhouse gas (GHG) emissions in the coastal environment To find out suitable rice cultivars for lowering GHG emissions with reduced negative environmental impacts.
	Effects of Bio-coated urea on rice yield in Boro season in the south-western costal ecosystem.	1. To evaluate the impact of bio-coated fertilizer on rice yield. 2. To determine the effect of bio-

		coated fertilizer on saline soil properties
	Effect of liquid nano urea on Rice Cultivation	To evaluate the impact of nano urea fertilizer on rice yield
	Effect of liquid nano zinc on Rice Cultivation	To evaluate the impact of nano urea fertilizer on rice yield
	Effects of long-term missing nutrients on rice yield	To identify yield limiting nutrients of rice
	Stability Analysis of BRRI Varieties at Satkhira	To find out the suitability and adaptability of the particular variety
	Rice Area Production Mapping (RAPM)	Mapping of rice cultivation area according to season
	Estimation of rice yield in different seasons of Bangladesh: Crop cuts method	1. To find out the on-farm yield of BRRI released rice varieties in Satkhira and Jashore regions 2. To analyze the performance of BRRI released rice varieties with other varieties
	Monitoring Soil-Water Salinity of BRRI Farm, Satkhira	To know the salinity status of BRRI-RS, Satkhira
	Monitoring Weather Status of BRRI Farm, Satkhira	To know the weather status of BRRI-RS, Satkhira
	Regional Station, Habiganj	
	Program Area: Varietal Development	
1.1	Advanced Yield Trial (AYT) of Deep-water Rice, B. Aman 2023-24	The genotype BR7920-1-2-3B (2.59 t/ha), and BR7737-1-2-2B (2.57 t/ha) produced higher grain yield than the checks Hbj. Aman-I (1.87 t/ha) and BRRI dhan91 (2.04 t/ha) but gave a similar yield with the check Aman-I (2.56 t/ha).

1.2	Regional yield trial (RYT) of shallow deep-water rice (RYT#DWR), B. Aman 2023	The advanced breeding line BR7730-1-1-2B (1.94 t/ha) produced the highest grain yield than the standard check BRRI dhan91 (1.76 t/ha) and local checks laxmi digha (1.72 t/ha) & Dud laki (1.93 t/ha).
1.3	Hybridization, T. Aman 2023-24	Two crosses were made using photosensitive advanced line IR16F1097-P1. A total of 141 F_1 seeds were harvested during T. Aman 2023-24.
1.4	Evaluation of long duration RYT tall materials under early transplanting conditions, T. Aman 2023-24	The genotype BR9892-8-2-2B (4.00 t/ha) produced the highest grain yield followed by BR10247-14-18-7-3 (3.60 t/ha) and BR10238-5-1-9-2B (3.30 t/ha) than the standard check BRRI dhan91 (2.02 t/ha) and BRRI dhan76 (3.13 t/ha).
1.5	Regional Yield Trial (RYT) for False smut resistant advanced lines, T. Aman 2023-24	None of the genotypes performed better than the checks BRRI dhan49 and BRRI dhan87.
1.6	ALART- Deep Water Rice (DWR), B. Aman 2023-24	The advanced line V2 was recommended for further testing.
	ALART- Deep Water Rice (DWR) B. Aman 2023-24	Data sent to ARD, BRRI for compilation
	ALART_ BB & Blast, Boro 2023-24	Data sent to ARD, BRRI for compilation
	ALART_ BB, Boro 2023-24	Data sent to ARD, BRRI for compilation
	ALART_FBR-LD, Boro 2023-24	Data sent to ARD, BRRI for compilation

	ALART_FBR-SD, Boro 2023-24	Data sent to ARD, BRRI for compilation
	ALART_PQR, Boro 2023-24	Data sent to ARD, BRRI for compilation
	ALART_ CTR, Boro 2023-24 (5 Locations)	Data sent to ARD, BRRI for compilation
Program Area: Pest Management		
2.1	Survey and monitoring of major rice insects in Habiganj district	Observing insect pest and natural enemy's population
2.2	Integrated Management of Bakanae Disease of Rice, Boro 2023-24	Data process on going
2.3	Observation of Efficacy of Trichocompost to Control Bakanae Disease, Boro 2023-24	Data process on going
Program Area: Crop Soil Water Management		
3.1	Optimization of planting times of BRRI developed Boro varieties	Optimum sowing time of BRRI dhan102 in Haor areas is first week of November wile it is third week of November for BRRI dhan101, BRRI dhan104 and BRRI dhan105.
3.2	Characterization and evaluation of rice genotypes for cold tolerance	BRRI dhan101 and BRRI dhan104 were found susceptible to cold at reproductive phase
3.3	Characterization of rice genotypes for lodging tolerance	BRRI dhan101 and BRRI dhan105 were found lodging sensitive varities and had higher lodging rate than BRRI dhan29. BRRI dhan104 and BRRI dhan102 showed moderately lodging tolerant but they had higher lodging rate than BRRI dhan29.
3.4	Evaluation of rice genotypes for preharvest sprouting	BRRI dhan101, BRRI dhan102, BRRI dhan104, BRRI dhan105 and BRRI

		dhan108 were found sensitive to viviparous germination. BRRI dhan107 had less preharvest sprouting.
	Program Area: Socio Economic and Policy	
4.1	Stability analysis of BRRI released rice varieties	Data sent to Agril Statistics Division of BRRI for compilation
	Program Area: Technology transfer	
5.1	Demonstration of Modern Rice Varieties **(Total demo 1100)** **GoB**: Aus: 100 bigha, Aman: 100 bigha, Boro: 300 bigha. **PARTNER Project**: Boro: 500 Acre **LSTD Project**: Boro: 100 Acre	BRRI dhan98 was found a suitable variety in Aus season at Sylhet region. BRRI dhan79, BRRI dhan95 and BRRI dhan103 were found suitable varieties in Aman season at Sylhet region. In Boro season, BRRI dhan96 is sutable in Haor areas to escape early flash flood. BRRI dhan92, BRRI dhan102 and BRRI dhan105 were found suitable varieties in Boro season at Sylhet region.
5.2	Breeder seed production	Produced more than 20 tons of breeder seeds to enrich seed stock
5.3	Breeder seed production	Produced more than 14 tons of breeder seeds for further seed multiplication.
5.4	TLS/Quality seed production	Produced arround 10 tons of TLS/Quality seeds for providing seeds to different stakeholders to enhance dissemination of modern rice varieties.
	Regional Station, Rangpur	
1	Development of rice varieties suitable in Rangpur region	8 germplasms were collected from farmers' field for maintenance breeding, five single crosses were made

		and 200 progenies were bulked from $2F_6$, and $2F_7$ generations
2	Breeding of Photoperiod-sensitive rice varieties (PSR) for Lowland and Charland ecosystem	50 progenies from 2 F_3 generations were selected. Three genotypes were selected from OYT. BRrang13-1-9-8-2-1 produced 3.0 t/ha yields advantage over Gainja (3.2 t/ha).
3	Breeding for Second Generation Rice (SGR)	250 individual plants and five fixed genotypes were selected from observational yield trial under the program of breeding for second generation rice. In OYT, BRrang13-RGA-1-1-3-1 produced 9.40 t/ha which was higher than BRRI dhan88 (6.85 t/ha).
4	Breeding for Basmati Rice	260 individual plants and six fixed genotypes were selected from OYT. BRrang55-RGA-3-2-1 gave highest yield (7.26 t/ha) over BRRI dhan50 (6.32 t/ha) in OYT.
5	Development of hybrid rice parental lines and hybrids	320 testcross F_1s were made from source nursery by testcross.
6	Effect of Time of Planting of Newly Developed BRRI Varieties in Different Regional Stations	Better yield was achieved in T. Aman when BRRI dhan87 and BRRI dhan90 transplanted on 20th of August. BRRI dhan93 produced higher yield on 20th July – 05th August. BRRI dhan75 should preferably be transplanted on 20th July- 20th August.