Research Progress 2015-16

Plant Breeding Division

Research Progress 2015-2016

Sl. No.	Research Progress	Expected Output
	Program area/ Project with duration	
1.1	Development of Upland rice Seven genotypes were evaluated in RYT and 3 were selected. In ALART, 4 genotypes were evaluated and one genotype (BR6848-3B-12) recommended for Proposed Variety Trial.	Proposed short duration Aus rice variety with high grain yield will be able to increase the productivity of upland Aus ecosystem of Bangladesh.
1.2	Development of Transplant Aus rice NERICA Mutant Pure Line (NMPL) was proposed by both Advanced Line Adaptive Research Trial (ALART) and Proposed Variety Trial (PVT) for proceeding in variety release protocol	Development of short duration rice varieties is promoted with acceptable yield performance suitable for T. Aus season
1.3	Development of shallow flood tolerant rice Four genotypes were selected having grain yield performance 4.15-5.61 t/ha and promoted to multi-location yield trial.	Development of rice varieties suitable for shallow flooded deep water environment having water level up to 1m depth
1.4	Development of rainfed lowland rice (RLR) WAS161-B-4B1-TGR 51(NERICA-L-32)was recommended for Proposed Variety Trial (PVT) from Advanced Lines Adaptive Research Trial (ALART) and NERICA Mutant from Proposed Variety Trial was recommended by the National Seed Board of Bangladesh (NSB) to release as a variety for T. Aman season. NERICA Mutant gave slightly higher yield (4.80 t/ha) than the standard check BRRI dhan39 (4.62 t/ha). The growth duration was similar with check variety BRRI dhan39.	Development of high yielding rice varieties with short growth duration and acceptable grain quality like BRRI dhan39 and BRRI dhan49 in T. Aman.
1.6	Development of salt tolerant rice In T. Aman 2015-16, in Preliminary Yield Trial#1, 11 genotypes were evaluated with two tolerant checks BRRI dhan53 and BRRI dhan54. Out of these 11 genotypes, four were	Salt affected areas will come under modern rice variety cultivation; yield will increase due to salt tolerance ability.

Sl. No.	Research Progress	Expected Output
	selected viz. BR8715-B-3-3-4, BR8718-B-2-2-1, BR8727-B-2-2-1 and BR8747-B-3-3-5 were selected based on earliness and high yield. In Preliminary Yield Trial#2, four genotypes out of 11 were selected based on phenotypic acceptability, earliness and grain yield and the selected genotypes are IR11T174, IR12T157, IR12T246, IR89609-8-2-B. BRRI dhan53 and BRRI dhan54 were used the tolerant checks in this experiment. In Secondary yield trial, 13 genotypes were grown andfive were selected. The criteria for selection were the earliness,phenotypic acceptance and shorter growth duration. BRRI dhan53 and BRRI dhan54 used as tolerant checks in SYT.one line was selected through PVS, viz. IR78761-B-SATB1-68-6. In Boro 2015-16, BR8980-B-1-1-1, BR8980-B-1-3-5, BR8980-3-4-1-3, BR8980-4-6-5and BR8992-B-18-2-26 were selected from PYT with yield potential of 5.5-6.1 t/ha at salinity level 5-6 dS/m.	
1.7	Development of premium quality rice In T. Aman 2015-16, BR7357-11-2-4-1-1 has been approved by the National Technical Committee (NTC) to release as BRRI dhan70 as aromatic premium quality medium slender rice. BR7697-15-4-4-2-2, long slender, slight aromatic premium quality ricefrom Proposed Variety Trial was recommended by the National Seed Board of Bangladesh (NSB) to release as a variety for T. Aman season. BR7697-15-4-4-2-2 gave 0.96 t/ha higher yield than BRRI dhan37 with 13 days earlier growth duration in the PVT. In Boro 2015-16, twogenotypes (BR8076-1-2-2-3, BR7372-18-2-1-HR1-HR6) from RYT were selected for ALART.	Short, medium, long and extra-long slender grain with or without aroma will be available for cultivation and export market.
1.8	Development of Rice Varieties for Favorable Environment Two breeding lines viz. BRRI dhan29-SC3-28-16-15-HR2 (Com),BRRI dhan29-SC3-8-HR1 (Com) showing 6.6 t/ha yield with 151 days growth duration were selected from regional yield trial.	The breeding linesmay be promoted to ALART in the variety releasing system and will increase the productivity of Boro season.

Sl. No.	Research Progress	Expected Output
1.9	Development of cold tolerant rice One breeding line (BR7812-19-1-6-1-P2) gave 6.0 t/ha yield showing cold tolerance at seedling stage with 145 days growth duration was selected from regional yield trial	The breeding line may be promoted to ALART in the variety releasing system and will increase the productivity of Boro season.
1.10	Development of High Beta-Carotene Rice (Golden Rice). Nine transgenic GR2-E BRRI dhan29 backcross introgression lines (BC5F4) showing similar or higher yield than BRRI dhan29 with acceptable amylose content and carotenoid content were selected.	These lines will be tested in multi-location confined field based on government approval.
1.11	Development of Micronutrient Enriched Rice Five breeding lines showing 5.1 -5.4 t/ha yield with 128-132 days growth duration from regional yield trial were selected in T.Aman season.	The breeding line will be promoted to ALART to include in variety releasing system and will increase the productivity of T. Aman season.
1.12	Development of insect resistant rice In T. Aman, 2015-16, from AYT#1,6 lines, from AYT#2, 4 lines and from AYT#3, 2 lines were selected for conducting secondary yield trial.	GM tolerant rice varieties with high grain yield will be developed
1.13	Development of disease resistant rice Two genotypes for BB and one for blast and three (BR7959-14-2-1, BRC171-2-1-2-2-2, IR73855-1-4-3-2-1) for RTV were selected from RYT during T. Aman season and in Boro 02 lines for BB resistance were selected from Advanced yield trial.	Development of BB, Blast & RTV resistant high yielding rice varieties/lines

Sl. No.	Research Progress	Expected Output
1.14	Development of submergence and water stagnation tolerant rice Two BRRI dhan49-Sub1 lines were promoted to PVT having submergence tolerance one week more than BRRI dhan52 and grain yield potential like BRRI dhan49. For introgressing *SUB1* into BR22, 13 plants were selected through Foreground+Phenotypic selection to produce 1120 BC_5F_1 seeds (BR22*6/BRRI dhan51). In case of introgressing *SUB1* QTL into BRRI dhan62, 143 BC_1F_1 seeds were produced (BRRI dhan62*2/IR64-Sub1). Under two times natural flood condition of Kurigram and Badarganj, BR9158-19-9-6-7-50 produced highest 5.1 t/ha grain yield. Maximum preferences were also recorded in favour of this entry. Under non-flooded condition of BRRI Gazipur, BR9159-8-5-40-13-52 produced the highest grain yield 6.35 t/ha. Under non-flooded on-farm condition in 3 locations, the highest grain yield (5.05 t/ha) was obtained from BR9158-19-9-6-7-50. Under controlled submerged condition of 18 days, BR9158-19-9-6-7-50 produced highest 5.8 t/ha grain yield but BR9159-8-5-40-13-57 showed maximum percentage of survival 99%.	Sub1 lines with better submergence tolerance with additional water stagnation tolerance will be released.
1.15	Development of Drought Tolerant Rice In T. Aman 2015-16, IR82589-B-B-84-3 has been approved by the National Technical Committee (NTC) to release as BRRI dhan71 as a drought tolerant rice variety. None of the genotypes from Participatory Variety Selection (PVS) in Rangpur were selected. In Rajshahi 3 genotypes from PVS and 26 genotypes from Advanced Yield Trial (AYT) were selected under STRASA project.	Development of high yielding rice varieties tolerant to drought stress in the rainfed lowland rice ecosystem in Bangladesh.
1.16	Development of low water aerobic rice varieties	Development of efficient high yielding rice which will have similar yield potential under aerobic condition but will save water in irrigated ecosystem

Sl. No.	Research Progress	Expected Output
	T. Aman 2015 The highest grain yield 6.48 t/ha with 134 days growth duration was obtained from IR11A334 from OYT-AWD. IR8140-B-78-U2-1 produced 5.67 t/ha grain yield with 117 days growth duration from OYT-Promising lines. In OYT-Nematode resistant breeding lines, IR97153-B-123 produced 5.86 t/ha grain yield with 125 days growth duration but IR 97153-B-55 showed resistance reaction with 0 (zero) root knot per tiller.	
	Boro 2015-16 Fifty two entries were selected from 142 entries based on grain yield (4.36-6.46 t/ha), growth duration (136-153 days) and phenotypic acceptability form OYT-3. In OYT-AWD, the highest grain yield 5.62 t/ha with 149 days growth duration was obtained from IR12N234. In case of evaluation of BRRI varieties under late boro condition, the highest grain yield 6.25 t/ha with 98 days growth duration was obtained from BRRI dhan60 at BRRI Gazipur.	
1.17	Development of Green Super Rice In T. Aman, one genotype (HUA565) was proposed for releasing as new variety.	Development of less input but high yield potential genotypes with tolerance to different stresses.
1.18	International Network for Genetic Evaluation of Rice (INGER) Totally 77 breeding lines were selected for yield trial and as parental genotypes from 11 nurseries	Rice varieties with diverse genetic background will be developed

Biotechnology Division

Research Progress 2015-2016

Sl. No.	Research Progress	Expected Output
1	Project I: Development of double haploid rice variety	
	Expt.1.1 Development of low glycemic index (GI) rice variety through anther culture A of total 58843 hybrid anthers from 21 crosses was plated in N6 and M10 media. In total 882 calli were obtained. The highest number of calli (290) was obtained from hybrid anthers of MR219/Kanaklata cross. In total	Low glycemic index (GI) rice variety will be developed from this experiment.

	60 green plants were regenerated from different cross. However 212 albino plants were also regenerated. Besides, 1058 F_1 seeds were harvested from 22 crosses for future anther culture program.	
	Expt. 1.2 Development of salt tolerant rice variety through anther culture A total of 51543 hybrid anthers from seven crosses were plated in N6 and M10 media and from them 217 calli were obtained. The highest numbers of calli (88) were obtained from hybrid anthers of BRRI dhan28/BRRI dhan61 cross. A total of one (1) and three (3) green plants were regenerated from BRRI dhan28/BRRI dhan61and BRRI dhan29/BRRI dhan61 cross respectively. However, twenty three (23) albino plants were also regenerated. Besides, one thousand six hundred and thirty six (1636) F_1 seeds were harvested from 8 crosses for future anther culture program.	Salt tolerant rice lines will be developed.
	Expt.1.3 Development of premium quality rice variety through anther culture A total of 34184 hybrid anthers of nine crosses were plated in N6 and M10 media and from them 512 calli were obtained. The highest numbers of calli (232) were obtained from hybrid anthers of BRRI dhan29/Kalizira cross. A total of one, 27 and 10 green plants were regenerated from the cross BRRI dhan50/Tepiboro (Ac. No. 930), BRRI dhan29/Kalizira and BRRI dhan50/Bashful, respectively. However 218 albino plants were also regenerated. Besides, 826 F_1 seeds were harvested from 8 crosses for future anther culture program.	Aromatic and fine grain rice lines will be developed.
	Expt. 1.4 Development of upland Aus variety through anther culture A total of 16604 hybrid anthers of seven crosses were plated in N6 and M10 media and from them 440 calli were obtained. The highest numbers of calli (128) were obtained from hybrid anthers of BRRI dhan28/NERICA 7 cross. A total of five green plants were regenerated from the five crosses BRRI dhan28/NERICA7, BRRI dhan29/ NERICA7, MR219/NERICA7 and BR (Bio) 8072-AC5-4-2-1-2-1/NERICA7, respectively. However, 312 albino plants also were regenerated. Besides, 760 F_1 seeds were harvested from 8 crosses for future anther culture program.	Short duration, high yielding upland Aus rice variety will be developed.

	Expt 1.5 Development of Swarna type rice variety through anther culture Sixteen differentcrossing was done among three Swarna genotypes with three BRRI varieties and in total 274 F_1 seeds were harvested. F_1 plants were planted for anther culture.	Swarna type rice variety will be developed.
2	Project II: Development of rice variety through somaclonal variation	
	Exp 2.1 Development of somaclone using EMS treated rice seed Three hundred seeds of BR11, BRRI dhan29, BRRI dhan48, BR8072AC5 and Tilbazal were used in this expt. Highest number of calli were obtained from BRRI dhan48 (168) followed by BRRI dhan28 (102) and BRRI dhan29 (86), respectively. Whereas highest regeneration was observed in BRRI dhan29 (28.67%) followed by BRRI dhan28 (10.52%) and BRRI dhan48 (10.12%), respectively.	Somaclonal variation will be created towards developing modern rice varieties.
3	Project III: Field evaluation of tissue culture derived advanced breeding lines.	
	Expt. 3 .1 Progeny selection During Aus/2015, 21 lines were selected from 69 pedigree lines. During T. Aman/2015, 41 lines were selected from 183 pedigree lines. During Boro/2015-16, Twenty lines were selected from 50 pedigree lines for further evaluation.	New rice variety will be developed from these lines
	Expt. 3.2 Observational trails During T. Aman 2015, a total of 11 doubled haploids were grown in as OT with standard checks to select desirable and high yield potential materials. Among them six doubled haploid lines were selected depending on the duration and comparable yield with checks.	New rice variety will be developed from these lines
	Expt. 3.3 Preliminary Yield Trial During Aus/2015, nine advanced lines were evaluated with standard checks in a PYT and three lines were selected for further evaluation. During T. Aman/2015, 21 advanced lines were evaluated with standard checks in three PYTs and among them 10 lines were selected for further evaluation. On the other hand, during Boro/2015-16 season 27 lines were evaluated with standard checks in PYTs and among them 13 lines were selected for further evaluation.	New rice variety will be developed from this study.
	Expt. 3.4 Secondary Yield Trial During T. Aman/2015, 15 advanced lines were evaluated with standard checks in two SYTs and among them nine	New rice variety will be developed from this study.

	lines were selected for further evaluation. Expt. 3.5 Regional Yield Trial During Aus/2015, three doubled haploid lines were evaluated with standard checks and none of them was selected for further evaluation.	New rice variety will be developed from this study.
4	Project IV: Development of rice variety through wide hybridization	
	Expt 4.1 Development of rice variety through wide hybridization followed by embryo rescue Crossing was carried out using five wild rice varieties and two BRRI varieties. Among them 17 plants were rescued from 4 crosses.	Different stress tolerant rice variety will be developed through wide hybridization
	Expt 4. Development of rice variety through wide hybridization followed by anther culture After hybridization, 296 F_1 seeds were harvested from 13 crosses for future anther culture program.	Modern rice variety will be developed through wide hybridization
5	Project V: Rice transformation studies	
	Expt.5.1 Development of salt tolerant transgenic rice Eight putative transformants (T_1 generation) of BRRI dhan29 were confirmed by *GlyI* and *GlyII* gene specific primer. Expt.5.2 Development of drought and salt tolerant transgenic rice Twenty putative transformed calli of BRRI dhan28 are now in regeneration stage. Fifty putative transformed calli of BRRI dhan30 are now in different selection stage.	Salt tolerant rice lines will be developed through genetic transformation Drought and Salt tolerant rice lines will be developed through transformation.
6	Project VI: Allele Mining	
	Expt 6.1 Identification of yield enhancement QTLs During Aus 2015, nine materials developed from QTL mapping population of BRRI dhan28*^{3}/ *O. rufipogon* (Ac. No. 103404) cross were evaluated as PYT and three lines were selected for SYT. During T. Aman 2015, six materials developed from QTL mapping population of BRRI dhan29*^{3}/ *O. rufipogon* (Ac. No. 103404) cross were evaluated as RYT and two lines were selected for ALART. During Boro, 2015-16, seven materials developed from QTL mapping population of BRRI dhan29*^{3}/ *O. rufipogon* (Ac. No. 103404) cross were evaluated as PYT and four lines were selected. Another six materials developed from QTL mapping population of BRRI dhan28*^{3}/ *O. rufipogon* (Ac. No. 105890) cross were evaluated as RYT and three lines were selected for ALART. Moreover, seven	Yield enhancing QTLs will be identified and also high yielding rice varieties will be developed.

	materials developed from QTL mapping population of BRRI dhan29*[3]/ *O. rufipogon* (Ac. No. 103404) cross were evaluated as RYT and four lines were selected for ALART.	
	Expt 6.2 Identification of QTLs for salinity tolerance both at seedling and reproductive stage In total 112 polymorphic SSR markers were identified in the study. Genotyping were completed with 37 Polymorphic SSR markers of a mapping population of 121 individuals derived from BRRI dhan29/ IR4630-22-2-5-1-3 cross.	QTLs for salt tolerance both at seedling and reproductive stage will be identified.
	Expt 6.3 Identification of QTLs for taller seedling height QTL mapping population was developed by crossing between BRRIdhan11/Shadamota (acc.no.1576) and 677 F_1 seeds were collected. Also a total of 99 polymorphic SSR markers were identified from 256 SSR primers.	QTLs for taller seedling height will be identified for developing tidal submergence tolerant rice variety.
7	Project VII: Gene Pyramiding	
	Expt 7.1 Gene pyramiding for resistance to bacterial blight (BB) Nine Bacterial Blight (BB) genes pyramid BRRI dhan29 rice lines having two BB resistant genes (*Xa4* and *Xa21*) were evaluated as PYT during Boro 2015-16 with standard checks. Among them five lines were selected depending on the phenotypic acceptability, yield performance and BB scoring These five lines were also confirmed by PCR with gene specific primers	Breeding lines possessing two (*Xa4* and *Xa21*) BB resistance genes will be developed through Marker Assisted Selection
8	Project VIII: Gene Cloning	
	Expt 8.1 Isolation and cloning of salt and drought tolerant gene Different salt tolerant gene like salt overly sensitive (SOS), potassium transporter (HKT), Na+/H+ antiporters (NHX), vacuolar H+ pyrophosphatases (e.g. AVP1), were selected from literature survey as a target salt tolerant gene for cloning. On the other hand for drought tolerant, DREB1and BREB2 will be targeted for cloning. *Porteresia coarctata* plants were treated with 100 mM NaCl salt for seven days then RNA extraction was done.	Salt and drought tolerant genes will be isolated and cloning

GRS Division

Research Progress 2015-2016

Sl. No.	Research Progress	Expected Output
Program Area 01: Varietal Development Program (VDP)		
3	Sub-program area: Rice Germplasm and Seed	
3.1.1	Project: Genetic Resources conservation and management • Collection of 252 germplasm. • Rejuvenation of 2336 germplasm and characterization of 218 germplasm with 53 morpho-agronomic characters. • Supply of 1523 accessions of germplasm and 404 samples of BRRI varieties for research and demonstration.	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.
3.1.2	Project: Molecular Characterization/DNA fingerprinting of plant genetic resources Fifty Aus rice germplasm and 26 BRRI varieties were characterized at molecular level using 51 SSR markers and another 31 newly collected rice germplasm were characterized using 36 SSR markers and 11 ILP markers. Moreover, except 26 BRRI varieties, their morphology characterization was also conducted.	Data generated through molecular and morphological characterization under this project would be helpful to establish ILP (Intron-Length Polymorphic) markers of Bangladeshi rice germplasm/variety.
3.2	Project: Seed production and variety maintenance • All BRRI developed varieties were maintained as nucleus stock. • During Boro season, 124.75 tons Breeder seed from 19 varieties and 53.26 tons from 37 varieties in T. Aman seasons were produced. • Again, 103.16 tons Breeder seed from 18 varieties in Boro, 4.8 tons from 12 varieties in Aus and 43.55 tons from 31 varieties in T. Aman seasons were distributed.	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 BRRI.
3.3	Project: Exploratory and genetic studies Genetic diversity was pronounced in 50 Aus rice germplasm and the genotypes were grouped into five (5) clusters. All the inter-	Estimated genetic variability, character associations, genetic relationships and selection criteria for yield and yield components of rice

	cluster distances were higher than intra-cluster distances indicating wider genetic diversity among the genotypes of different clusters.	germplasm would be used for clear understanding of genetic makeup of the tested germplasm.
3.4	Documentation of technology: During reporting year, 400 accessions were documented in computer through *Microsoft Office Excel* program with collected available information.	Characterized information of the germplasm could be utilized for selecting parent(s) in breeding program.

Hybrid Rice Division

Research Progress 2015-2016

Sl. No	Research Progress	Expected Output
	Program Area: Varietal Development Project: Material development, seed production and its distribution Duration: 2015-2016	
01.	One CMS (A) line (BRRI53A/BR7873-5(NILS)-51-HR6 as BRRI85A having diverse characters were developed.	This CMS lines will use for new hybrid rice variety development for T Aman season.
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 1800 kg of F_1 seeds of BRRI hybrid dhan2, BRRI hybrid dhan3 and BRRI hybrid dhan4 were distributed under Priojpur, Gopalganj and Bagerhat Integrated Agricultural Productivity Project at project commanding areas	Popularization of BRRI released hybrid varieties.
04.	Seed production program of BRRI hybrid dhan2, BRRI hybrid dhan3 and BRRI hybrid dhan4 was initiated at farmers level under Mymensingh, Gopalganj and Lalmonirhat district	Farmers can 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

Grain Quality & Nutrition Division

Research Progress 2015-2016

Sl.No.	Research Progress	Expected output
	Programme area / Project with duration	
Varietal Development		
1.1	Determination of physicochemical and cooking properties of rice grain	Newly developed breeding lines will be identified lines with superior grain quality.
1.2	Physicochemical and cooking properties of recently released BRRI varieties	Physicochemical and cooking properties of recently released 14 BRRI HYV rice varieties from BRRI dhan51 to BRRI dhan64 will enhance our rice database.
1.3	Effect of soaking time on grain and nutritional quality of cooked rice	Soaking before cooking is very important for energy consumption, elongation, volume expansion and protein content. Variation of soaking time may have positive effect on energy consumption, volume expansion, elongation and protein content.
1.4	Effect of salinity on grain quality and nutritional status of salt tolerant rice	Higher amylose content will desirable for developing salinity tolerant plant breeding material in future.
2.1	Evaluation of high zinc rice through sensory evaluation	Sensory evaluation test will assess appearance, tenderness, taste and aroma of high zinc rice variety.
2.2	Determination of oil content and chemical composition of rice bran oil extracted from different aged bran	Highest amount of rice bran oil will identify from tested different rice varieties and storage condition.
3.1	In Vivo experiment of Glycemic Index (GI) for BRRI released rice varieties (Long Evan rat)	Low and intermediate GI rice varieties will identify among BRRI released HYVs and hybrid rice in vivo using experimental Long Evan rat model.
3.2	Estimation of antioxidant status of BRRI released rice varieties using in vivo experimental rat model	Comparative analysis will evaluated antioxidant status for dietary administration of high, intermediate and low antioxidant enrich HYV rice varieties in rat model
4.1	Formulation of rice based biscuit and analyze the nutritional characteristics	Nutritional quality will be identified from formulated rice based food products
4.2	Identification of γ-Aminobutyric acid (GABA) in rice and its health benefits as a	Elevated level of GABA will be identified from pre-germinated

	value added food	BRRI varieties.
4.3	Efficacy of alkaloid extracted from Swietenia Mahagoni on insect pest of rice	Different extraction procedures of alkaloids will identify the efficacy on rice insect (BPH) management.

Agronomy Division

Research Progress 2015 – 2016

Sl. No.	Research Progress	Expected output
01	Seeds and seedlings	
	1.1 Expt: Effect of different seed bed media on rice seedling growth during boro season Progress: Treatment T_1 (50% Mixed Rice Husk & Bran+ 50% Soil) produced good quality seedling in respect to seedling height, number and dry weight followed by T_5 (50% Ash+ 50% Soil + 60 kg N/ha) and T_3 (50% Saw Dust+ 50% Soil).	Appropriate seedling raising media for quality seedling will be found out.
02	Planting Practices	
	2.1 Expt. Effect of time of planting on growth and yield of advanced lines in Boro season. Research progress: Grain yield of rice and growth duration gradually decreased with the advancement of planting dates, irrespective of promising lines/varieties. In T. Aman, None of the promising line produced higher grain yield over check varieties BRRI dhan39, BRRI dhan56, BRRI dhan57 and BRRI dhan62 irrespective of planting dates. However, only Nerica mutant showed similar grain yield with check but matured 2 days earlier. In Boro, None of the promising line produced higher grain yield over check varieties BRRI dhan28, BRRI dhan29 and BRRI dhan58, irrespective of planting dates. However, two promising lines- BR (BIO) 8072-AC5-4-2-1-2-1 and BR (BIO) 8072-AC8-1-1-3-1-1 showed similar grain yield with similar growth duration with check variety BRRI dhan28.	Appropriate line for Aman and Boro season will be found out.
	2.2. Performance of BRRI dhan62 under different spacing and levels of nitrogen Research Progress: Nitrogen rate at 61 kg ha^{-1} with 15 x 15 cm spacing was found appropriate for maximum grain yield of BRRI dhan62.	Appropriate Nitrogen management with spacing will be determined
03	Fertilizer Management	
	3.1 Expt: Nitrogen management in short duration varieties in rainfed condition Progress: At Rajshahi, USG application at 3DAT obtained highest yield (4.57t/ha) compared to Prilled urea application and fertilizer from farmers practice.	Appropriate Nitrogen management for short duration varieties will

	At Gazipur USG, prilled urea application and farmers practice obtained statistically similar grain yield of 4.34, 4.48 and 4.32 t/ha respectively compared to control plots.	be achieved
	3.2 Expt. Influence of N levels on growth, productivity and quality of premium quality rice (PQR) under AWD irrigation system Progress: The variation of grain yield of premium quality rice varieties at different levels of N under AWD irrigation system was estimated through regression equation. The optimum nitrogen dose for BRRI dhan50 and BRRI dhan63 were 130 and 108kg N ha^{-1}, respectively.	N level for PQR will be found out for AWD condition.
	3.3 Expt. Validation of the performance of Fertilizer Deep Placement (FDP) in Farmer's Field During Boro Season at Rangpur Region Progress: Fertilizer deep placement has an important role for higher rice production in light texture soil of Rangpur region. NPK briquette deep placement produced highest grain yield irrespective of all location followed by USG deep placement.	Efficiency of FDP for light texture sol will be found out.
	3.4 Expt. Performance of SWARNA cultivars to different fertilizer management options Progress: This experiment was conducted in T. Aman, 2015 at BRRI farm, Gazipur using five SWARNA cultivars with checks (BR11 and BRRI dhan52) under two fertilizer management options. Nepali Swarna gave higher grain yield (5.70 t ha^{-1}) with farmer's fertilizer practice and it was higher than BR11 and BRRI dhan52 but GootySwarna gave higher yield (6.11 t ha^{-1}) with BRRI fertilizer management practice. Nepali SWARNA is less responsive to balanced fertilizer whereas, SWARNA5 and GootySwarna are responsive.	Swarna variety will be required less inputs (fertilizer and water) for production of satisfactory grain yield.
	3.5 Expt. Yield Maximization of Boro Rice Through Adjustment of Ratio of N Splitting Progress: This experiment was conducted in Boro, 2015-16 at BRRI farm, Gazipur. Three rice varieties (BRRI dhan28, BRRI dhan63 and BRRI Hybrid dhan3) were tested under two N splitting techniques. BRRI hybrid dhan3 produced significantly higher grain yield with both the N management techniques over BRRI dhan28 and BRRI dhan63. BRRI dhan28 didn't show positive response in grain yield on modified N management technique. Although, there was no significant difference in grain yield of BRRI dhan63 and BRRI hybrid dhan3, they showed positive response (0.4 t ha^{-1} higher yield over BRRI N management technique) on modified N management technique.	Modified splitting of N application may increase N use efficiency of rice.
4	Yield Maximization	
	4.1 Expt. The effect of crop establishment methods for yield improvement of T Aus rice for Rangpur region. Progress: In T Aus season, BRRI dhan48 produced highest grain yield (4.5 t/ha) by SRI crop establishment method followed by recommended crop establishment method than Line sowing methods in Rangpur region. In T Aus season, BRRI dhan48 produced highest grain yield (4.5 t/ha) by SRI crop establishment method followed by	Appropriate crop establishment method for T Aus will be found out

	recommended crop establishment method than Line sowing methods in Rangpur region.	
	4.2 Expt. Validation of Nutrient and Crop management options for yield maximization of BRRI dhan51 at Rangpur region in T. Aman season Progress: BRRI dhan51 was submerged continuously 26day at vegetative stage continuously. As a result the crop was totally damaged.	Total agronomic packages for submergence varieties will be found out
	4.3 Expt. Validation of weed control and crop management option for yield maximization of BRRI dhan56 in draught condition at Rangpur region in T. Aman season Progress: Crop management 1 (25 days old seedling with 20 x 15 cm spacing, 2 seedlings per hill and 4th week of July transplanting) with any one tested weed management (Pre emergence herbicide + one hand weeding or Post emergence herbicide + one hand weeding or Pre emergence herbicide + Post emergence herbicide) option may adopted for higher yield.	Total agronomic packages for BRRI dhan56 (drought tolerant variety) will be found out
	4.4 Expt. Validation of weed control option and crop management for yield maximization of and BRRI dhan57 in draught condition at Rangpur region in T. Aman season Progress: Crop management 1 (25 days old seedling with 20 x 15 cm spacing, 2 seedlings per hill and 4th week of July transplanting) with any one tested weed management (Pre emergence herbicide + one hand weeding or Post emergence herbicide + one hand weeding or Pre emergence herbicide + Post emergence herbicide) option may adopted for higher yield	Total agronomic packages for BRRI dhan57 (drought tolerant variety) will be found out
	4.5 Expt. Validation of weed control option and crop management for yield maximization of short duration variety BRRI dhan62 in draught condition at Rangpur region in T. Aman season Progress: Crop management 1 (25 days old seedling with 20 x 15 cm spacing, 2 seedlings per hill and 4th week of July transplanting) with any one tested weed management (Pre emergence herbicide + one hand weeding or Post emergence herbicide + one hand weeding or Pre emergence herbicide + Post emergence herbicide) option may adopted for higher yield.	Total agronomic packages for BRRI dhan62 (short duration T Aman variety) will be found out
5.	Weed Management	
	5.1 Expt. Weed control methods on productivity of wet direct seeded rice Progress: During the reported Aus and Boro season most of the weeds were effectively control by herbicides Pretilachlor + Pyrazosulfuran ethyl and Bispyribac sodium along with one hand weeding in direct wet seeding method.	Weed control methods for wet direct seeded rice will be found out.
	5.2 Expt. Effect of herbicides on soil microbial population	Soil microbial

	Progress: Natural soil consist higher microbial population. Significant herbicidal effect was found in 10 to 15 days after herbicide application. All bacterial population surged 10 days after herbicide application but fungal population surged 3 days after herbicide application. Mefanecet490g/kg + Bensulfuran-methyle 40g/kg inhibited highest growth of all bacteria and fungus than Pyrazosulfuron ethyl 10WP.	population will be measured.
	5.3 Expt. Effect of non selective herbicide to control aquatic weeds in Gopalgonj district. Progress: Farmer can save 17000-18000TK. /ha if they practice Gramoxne to control annual and perennial weeds after receding of water and prior to land preparation in Gopalgonj district.	Control measure of aquatic weeds in Gopalgonj district wll be found out.
	5.4 Expt. Effect of different weed management options in USG applied transplanted rice (On going) Progres: In Boro season, no weed have been observed at 40 DAT in Pre emergence herbicide (Bensulfuran methyl+Acetachlor, and Metsulfuran methyl+Bensulfuran methyl) application field in which USG were application before herbicide application and give higher grain yield in that treatments.	Different weed management options for USG applied transplanted rice will be found out.
6.	Project Activities (PGB IADP)	
	6.1. Intensification the productivity of single Boro cropping pattern through integrated SDWR+fish culture during Aman season in Gopalganj area Research progress: SDWR+fish culture is profitable (BCR 1.65) during Aman season instead of single Boro cropping pattern.	Increasing farm productivity at the project site.
	6.2. Evaluation of modern rice varieties in Pirojpur-Gopalganj-Bagerhat area under IADP-PGB project Research progress: Newly released varieties showed better performance than the existing cultivated variety and gave 8-10% yield advantage.	Farmer will choose variety depending on their choice.
	6.3. Site Specific nutrient management in peat soil Research progress: The highest grain yield was obtained from NPKSZn treated plot in all locations. Omission of N and P significantly effect in all plot.	Response of nutrients in peat soil.
	6.4.Optimization of P fertilizer in peat soil at Gopalganj district Research progress: TSP 150 kg /ha produced the highest yield in different locations which is comperable with the FP.	Response of nutrients in peat soil.
	6.5. Crop productivity improvement by introducing modern variety and fertilizer management in Pirojpur, Gopalganj and Bagerhat region Research progress: In T. Aman season 30 field trail and in Boro season 68 field trail were conducted in the farmers field and USG with BRRI management gave 6.5% and 5.4% yield increase over farmers practices in T.Aman and Boro season respectively.	Suitable fertilizer management would be adopted in the farmer's field.

	6.6. Cost effective weed management in T. Aman and Boro rice Research progress: Farmers can save 8250-9750 Tk/ ha following herbicide and Boro weeder than HW.	Cost efficient weed management would be recommended for the farmers.
	6.7. Cost effective fertilizer management in T. Aman and Boro rice Research progress: Balanced fertilizer with USG application gave the highest yield advantages about 8-10% over Farmer's practices.	Cost efficient fertilizer management would be recommended for the farmers
	6.8. Effect of non-selective herbicide to control aquatic weeds in Gopalgonj district Research progress: Gramoxone (Paraquat) control all kinds of weeds with total cost of 2500 Tk./ha, whereas hand pulling cost of farmer was about 20,000 Tk./ha.	Appropriate cost effective weed control method will be find out

Irrigation and Water management Division

Research Progress 2015-2016

Sl. No.	Research Progress	Expected Output
	Sub-Program: Irrigation and Water Management	
Sub-Sub-Program I: Water Use Efficiency Improvement in Irrigated Agriculture		
01	Water Requirement *Experiments:*	
	1.1. Determination of physical and hydraulic properties in different soil types Progress: The study was conducted in 4 locations of Tanore, Rajshahi; Ishwardi, Pabna; Kaharol, Dinajpur; and Thakurgaon Sadar, Thakurgaon. The soil texture of different location varied from clay-loam to loam. It also varied within the soil sample depths. The moisture holding capacity also varied with the soil texture. Most of the cases the top soil moisture removed faster with an exception to Kaharole, where the soil of 10-25 cm depth removed faster. The results also indicated that clay-loam soil (Thakurgaon) retained	Soil moisture characteristic curve and constant infiltration rate (i.e. saturation hydraulic conductivity) is helpful for determining suitable schedule of irrigation water for crops at farm level. Therefore optimum water use and estimation of irrigation interval can be determined by using the developed soil-moisture characteristic curves and hydraulic conductivity.

	more water compare to silt-loam (Kaharole). Available moisture range in different depths of Tanore soils was found 15.52-25.85%, whereas wilting point varied from 9.5-14.15% for silt-loam to loam soil. Similarly available moisture range of Thakurgaon area soils were 10.59-28.77 percent and wilting started from 5.69-7.40 percent, respectively in clay-loam to loam soil. The available moisture range of Kaharole areas was 12.11-31.03%, and wilting point varied from 5.09-11.36 percent, respectively in silty-loam to loam soils. The silty-clay to silt-loam soils of Ishurdi was found that the upper and lower limit of available moisture were 16.01-32.59% and 14.71-17.24 percent, respectively. The constant infiltration rates or near-saturated hydraulic conductivity was faster in light textured soil. The constant infiltration rate was highest at Kaharole (9.6 mm/hr) in silt-loam to loam soil, whereas, it was lowest in Ishurdi (1.8 mm/hr) in silty-clay to silt-loam soil. Most of the cases, the soils are loamy in texture and the rate of infiltration was higher.	
	1.2 Development of Soil moisture declination model for alternate wetting and drying (AWD) irrigation for Rice cultivation Progress: Soil moisture characteristics curve for the experimental field soils were developed by using pressure plate apparatus. The result shows that soil moisture content goes below field capacity in all the layers when perched water table reached at 20 cm below ground level. A model has been developed to determine the irrigation interval at different stages of growth of rice.	Development of model for prediction of efficient irrigation schedule of rice.

	1.3 Identification of suitable water-use-efficient genotype and appropriate water management under low water situation, T. Aman 2015 Progress: Due to high amount of rainfall during T. Aman season, no water treatment is applied. Among the varieties, BRRI dhan66 performed well in rainfed condition. The experiment need to be repeated again for further evaluation.	Find out the water efficient genotypes for sustainable rice production under different water regimes in T. Aman.
	1.4 Identification of appropriate water management under water saving situation in Boro season Progress: The genotypes IR83140-B-36-B-B and IR83142-B-71-B-B performed well in different water regimes, which may be recommended as water efficient variety. The highest performance occurred in -10 kPa, which is close to AWD water treatment. Due to high amount of rainfall during Boro season, therefore, the experiment may be repeated again for further evaluation.	Find out the water efficient genotypes for sustainable rice production under different water regimes in Boro.
	1.5 Optimization of irrigation water for maximum year round production Progress: Potato-BRAUS-T. Aman cropping pattern gives the highest yield with comparatively less amount of irrigation. BRRI dhan48 performed better as a Braus variety compared to BRRI dhan28. Economic analysis is under processing.	Selection of cropping patterns for higher productivity, higher economic benefit and lower irrigation requirement

Sub- Sub Program II: Utilization of Water Resources in Rainfed Environment		
02	Water Management for rice cultivation in climate change environment	

	2.1 Terminal Drought Mitigation Adopting Transplanting Dates in T. Aman, 2015 Progress: Drought amount at different growth stages of rice for different dates of transplanting shows that BRRI dhan33 suffered comparatively less drought than BR11 due to its shorter growth duration. In 2015, drought in reproductive phase no drought found at transplanting up to 15 July but moderate amount of drought (22.6 mm) observed in up to 12 August transplanting. But in ripening phase moderate drought found at transplanting from 8 July to 22 July. Drought increased rapidly after 12 August transplanting and onward. In case of BR11 similar drought found in reproductive phase for transplanting up to 22 July and it gradually increased when it transplanted at 5 August and onward. Ripening phase faced moderate drought when for a transplanting period of 22 July to 12 August then it increased rapidly. Yield decreased for both short and long duration variety after transplanting on 29 July	Development of a transplanting period for low risk of drought occurrence during critical stages of T. Aman rice.
	Expt. 2.2. Effect of drought on different T. Aman varieties **P**rogress**:** Considering the growth duration, rainfall and yield performances BRRI dhan31, BRRI dhan53 and BRRI dhan56 were found more drought stress tolerant among the long, medium and short duration varieties, respectively	Find out suitable T. Aman variety for drought prone areabased on the yield performance
	Expt. 2.3. Rain water harvesting from roof top of BRRI campus, Gazipur Total 791.92 mm rainfall was recorded from August, 2015 to June, 2016 which produced 20.25m^3runoff from the catchment area of 49 m^2. Highest monthly total 339.84 mm rainfall was occurred in the month of May which produced 9.6158 m^3 runoff. Result shows that the catchment area has a runoff coefficient of 0.48**.** Runoff volume produced from the catchment depend not only the roughness of the catchment but also the amount of rainfall. Result also shows that rainfall less than 20 mm produced about 30% runoff and gradually increased on ward. More than 70 percent runoff was observed from a rainfall greater than 100 mm.	Determine the total amount of rain water harvested from the roof and also determine the scope of rain water utilization,
Sub- Sub Program III: Land Productivity Improvement in the Coastal Environment		

03	Land and Water Resources Use for Sustainable Crop Production *Experiments:*	
	3.1 Assessment of suitable water resources availability for irrigation to increase crop production in tidal areas of Barisal region Progress: A considerable part of the upstream Buriswar, Biskhali and Baleshwar river was suitable for irrigation throughout the dry season. The adjacent area of the rivers could be used for irrigated crop production	Find out to locate areas suitable for irrigated rice (Boro) and non-rice crops production in the region.
Sub- Sub Program IV: Sustainable Management of Water Resources		
04	Surface and Ground Water Assessment *Experiments:*	
	4.1 Monitoring of groundwater fluctuation and safe utilization in different geo-hydrological regions Progress: Weekly groundwater table monitoring data has been taken in BRRI Gazipur and from different regional stations of BRRI. Hydrograph was prepared for each of the stations. A separate graph was prepared with the maximum and minimum groundwater table data of the monitoring stations.	Determination of declination rate of groundwater level in different regions of Bangladesh
	4.2 Delineation of areas having water shortage during Boro rice cultivation in NorthwestBangladesh **Progress:** The survey work has been done at two upazila of Pabna district named Chatmohor and Faridpur. Water level of shallow zone declined below the suction limit around 5 to 6 years ago in Chatmohor and Faridpur upazila. From farmer's opinion, the groundwater level was within 30 to 35 ft during the dry period. The depletion rate of groundwater is 1.5-3 ft/yr. Maximum STWs were now deep set and very deep set up to 15 feet below the ground surface. Boro area decreased and non-rice area increased as well as cropping pattern has been changed due to declination of groundwater.	Identify the area facing water shortage in boro season in Northwest Bangladesh.
Sub- Sub Program V: Renewable energy		
05	Renewable energy for irrigation *Experiments:*	
	5.1 Effectiveness of solar pump for irrigated rice Progress: Surface water is being pumped from a pond at 3 m head. Variation in discharge was found in different months and daytime. In September 2015, the highest discharge rate was 170 lit/min at 12.00 pm and average discharge rate was 45.5 m^3/day. Due to cloudy sky sometimes the discharge rate was very low in April 2016.	Selection of an effective pump and solar panel for rice irrigation

	The highest discharge was recorded at 59.37 m^3 (59370 lit) and lowest at 24.88 m^3 (24.880 lit). In February 2016, average discharge and maximum rate was at 39 m^3 (39,000 lit) and 48 m^3 (48,000), respectively. It was comparatively lower than that of other months because of short day length and sometimes foggy day. From March to April, the discharge rate increased successively during this period. Average and maximum discharge was also higher. From February to May, 2016 discharge found lower than that of 2015 due to auto tracker was not in operation. Highest discharge recorded at 57.42 m^3 and 59.37 m^3 in March and April, respectively. But in May a heavy storm displaced the panel arrangement which affect the discharge. In June, the average and maximum discharge rate was at 50 m^3 and 63.55 m^3, respectively. Two year research findings showed, 1.5 hp capacity solar pump can be irrigated maximum around 1 ha land for Boro rice. This experiment will be continued next season and finally economic analysis will be done	

Plant Physiology Division

Research Progress 2015-2016

Project 1: Salinity Tolerance			
Sl. No.	Name of experiments	Output	Duration
1.1	Screening of rice genotypes for salinity tolerance at seedling stage 1. Germplasms	200 BRRI Gene Bank germplasm have been tested and 25 germplasm identified as moderately tolerant	March, 2015-Feb., 2016
	2. Advanced breeding lines	Out of 8, three genotypes IR78761-B-SATB1-68-24, BRRI dhan53 and IR77092-B-2R-B-10 showed visual score 4-5 that is tolerant to moderately tolerant	
	3. GSR materials	None of the genotypes were found tolerant at high salinity stress.	
	4. INGER materials	Among 56 genotypes, 21 genotypes IR13T106, IR14T102, IR14T104, IR14T105, IR14T109, IR14T128, IR13T141, IR12T195, IR11T171, IR11T189, IR11T197, IR11T205, A-69-1, CSR 28, CSR-90IR-2, IR55179-3B-11-3, IR58443-6B-10-3, IR66946-3R-178-1-1, NONA BOKRA, POKKALI, BRRI dhan53 showed visual score 3 to 5 that is tolerant to moderately tolerant at high salinity stress	
	5. Anther cultured lines	Out of 7 genotypes, three genotypes	

	for T. Aman season	BR8018-AC2-2-2-1, BR8019-AC9-3-3-1and BR8032-AC4-1-2-2 which showed visual score 6	
	6. Anther cultured lines for Boro season	Among 8 genotypes, three genotypes BR(BIO)9777-26-4-1, BR(BIO)9777-79-3-4 and BR(Bio)9777-113-12-5 showed visual score 5 that is moderately tolerant.	
1.2	Characterization and evaluation of some rice genotypes for salinity tolerance at reproductive stage	Considering yield potentiality and tolerance ability at different salinity stress IR77092-2R-B-10, IR73055-8-1-1-3-1 and IR78761-B-SATB1-68-6 could be used for further breeding program	June, 2015-Nov., 2016
1.3	Characterization and evaluation of anther cultured lines for salinity tolerance at reproductive stage	Considering the yield related traits and tolerance ability none of the genotypes could be selected for reproductive stage at 8dS/m salinity stress	Dec., 2015-April, 2016
1.4	Mechanisms of Salt Tolerance of Rice Genotypes at Different Growth Stage	Data is under processing	Dec., 2015-June, 2016
1.5	Mapping QTLs for salinity tolerance of Ashfal balam at seedling stage	Genotyping completed and only linkage map has been constructed. Phenotypic characterization will begin in T. Aman 2016 for QTL mapping.	2015-2017
1.6	Mapping QTLs for salinity tolerance of Ashfal balam at reproductive stage		2015-2017
Project 2: Submergence Tolerance			
2.1	Screening of rice germplasms against complete submergence	All genotypes (100) were elongating type and could not be selected for submergence tolerance, rather they might be suitable for deep water rice.	May, 2015-June, 2015
2.2	Observation of phenological development and recovery period of rice varieties at different submergence period	After 12 days of complete submergence survivability of BRRI Acc. No. 1838, BRRI Acc. No. 4096, BINA dhan11 and tolerant check FR13A was 100%, while it was 98.6, 94.4 and 0 % for BRRI dhan51, BRRI dhan52 and BR5 respectively. Furthermore, after 18 days of complete submergence survivability of Acc. No. 1838, Acc. 4096 and BINA dhan11 was more than 80% and it was similar with FR13A. Survivability of BRRI dhan52 (75%) was significantly less than FR13A (94%). Moreover, BRRI dhan51 showed susceptibility at 18 days of complete submergence. On the other hand,	July, 2015-Nov., 2015

		none of the genotypes survived when completely submerged for 24 days.	
2.3	Screening of advanced breeding lines against medium water stagnation	Out of 53 genotypes, none of the genotype was suitable for medium water stagnant condition	July, 2015-Nov., 2015
Project 3: a) Drought Tolerance			
3.1	Screening of rice germplasms for drought tolerance at reproductive phase, T. Aman' 2015	Out of 173 germplasms 36 genotypes produced grain yield more than check variety BRRI dhan56 having the sterility percentage below 50%	June, 2015-July, 2016
3.2	Performance of some genotypes under drought stress at reproductive stage	Data is under processing	Dec., 2015-April, 2016
b) Low water requirement/aerobic rice			
3.3	Characterization and Evaluation of advanced breeding lines at low water condition	Data is under processing	Dec., 2015-April, 2016
3.4	Screening for deep rooting ability of some advanced breeding lines 1. Aus rice genotypes	Considering root dry weight, CRL and root shoot ratio and number of root below 30cm depth genotype BR7698-2B-1-9-2, BR7992-2B-5-2 and BR7383-2B-23 performed well and could be used for further evaluation.	March, 2015-April, 2015
	2. Advanced breeding lines (T. Aman)	Genotypes IR84788-40-3-3-1-1, IR90228-1-3-3-3-2, BR6855-3B-12 and BR7182-2B-1-HR4 performed well and could be used for further breeding program.	July, 2015-August, 2015
	3. Advanced breeding lines (Boro)	Genotype IR94224-17-1-3-3, IR95781-15-1-1-4, MTU1010, IR93827-29-1-1-2, IR93856-104-1-1-4, IR93806-19-4-3-1, IR93810-17-1-4-1, IR92545-24-1-1-2, IR92545-42-2-2-1 performed well and could be used for further evaluation	Dec., 2015-Jan., 2016
Project 4: Heat Tolerance			
4.1	Evaluation of rice genotypes towards the development of heat tolerant rice	Among the landraces Acc nos. 152, 183, 184, 185, 187, 267, 272, 571, 572, 574, 808, 811, 812, 813, 814, 815, 817, 1203. 1205, 1208, 1210, 1317, 1318, 1321, 1549, 1626, 1629, 1630, 1643, 1680, 1681, 1684, 1689, 1692 showed 41 to 60% spikelet fertility under heat stress condition and got score 5 and Acc nos 563, 568, 816, 1212, 1532, 1546, 1688 showed 61 to 80% fertility and scored 3. Among the tested breeding lines seven breeding materials scored 5. Moreover, BRRI dhan62 and an exotic rice variety PSBRC 82 got score 5. Among the eight IRRI breeding lines four materials	Feb., 2015-Sep., 2015

		scored 3 and one scored 5	
4.2	Progress of the development of heat tolerant BRRI dhan28 and BRRI dhan29 by introgressing spikelet fertility QTLs *(qSF4.1)* through Marker-Assisted Selection	After selection through R4M30 and CAPS, a total of 78 progenies (17 from BRRI dhan28 and 61 from BRRI dhan29) were selected and advanced to BC_3F_2. Phenotypic selection and fixation of the QTL loci will be carried out on the next Aus season	2013-2018
Project 5: Cold Tolerance			
5.1	Screening of rice genotypes for cold tolerance at seedling stage	Among the tested germplasms, none was found tolerant, while only 63 germplasms showed average visual score (SES) 5.0 to 5.5 that is classified as moderately tolerant.	Oct., 2015-July, 2016
5.2	Evaluation of advanced breeding lines for reproductive stage cold tolerance	Considering plant height, growth duration, last internode length, panicle exertion, phenotypic acceptance, grain size and yield, 13 genotypes (BR8909-B-12-2-CS1-4-CS2-P6-1, BR8562-28-3-1-3-CS1-1-CS2-P3-2, BR8562-28-3-1-3-CS1-1-CS2-P3-4, BR8909-B-12-2-CS1-4-CS2-P5-5, BR8909-B-12-2-CS1-4-CS2-P5-6, BR8909-B-12-2-CS1-5-CS2-P1-3, BR8909-B-12-2-CS1-5-CS2-P1-4, BR8909-B-12-2-CS1-5-CS2-P1-4, BR8562-28-3-1-3-CS1-2-CS2-P2-1, BR8562-28-3-1-3-CS1-2-CS2-P2-3, BR8907-B-1-2-CS1-4-CS2-P6-4, BR8907-B-1-2-CS1-4-CS2-P2-2, BR8907-B-1-2-CS1-4-CS2-P3-2) were selected.	Oct., 2015-July, 2016
5.3	Evaluation of some rice genotypes for reproductive stage cold tolerance	After cold treatment, growth duration and sterility were increased, whereas plant height, last internode length, panicle length, panicle exertion and field grain/ panicle were reduced in all rice genotypes except Bhutan, HbjB-VI and Jinbubyeo which were less affected. Rice genotypes Bhutan showed the best performance in relation to cold tolerance at reproductive stage	Nov., 2015-July, 2016
5.4	Characterization and evaluation of some cold tolerant rice genotypes for whole growth periods under natural condition	Considering Plant height, panicle length, last internode length, last leaf sheath length, flag leaf length, panicle exertion and yield IR87322-65-2, IR10K150, MILYANG240, IR02K101, IR68333-R-R-B-19 and IR83222-F11-85 were selected as cold tolerant at reproductive phase which could be used as donor parents	Nov., 2015
5.5	International temperate rice observational nursery (IRTON, 2015)	Among the tested genotypes four genotypes (IR83222-F11-15, IR83222-F11-156, YR14323-69-2-3-2-1 and IR12K268) were selected as moderately tolerant to cold with	Nov., 2015-July, 2016

		other good agronomic characteristics specially yield. Rice genotypes IR83222-F11-156 showed the best performance in relation to cold tolerance and yield.	
5.6	Demonstration of nursery management by polythene covering technique for seedling raising in cold prone Northern region of Bangladesh during Boro season	The polythene covering seedbed technology can be recommended for massive diffusion through extension service providers like DAE in cold prone Northern region of Bangladesh	Nov., 2015-July, 2016
Project 6: Growth studies			
6.1	Photo-sensitivity test of some advanced breeding lines and BRRI released modern T. Aman varieties	On the basis of PSP and RPS BRRI dhan66 is weakly photoperiod-sensitive, BR7941-119-1-2-1, BR7441-30-1-1-1, BR7941-116-1-2-1, BR7941-41-2-2-4, BRRI dhan44 are moderately photoperiod-sensitive and BRRI dhan46 is strongly photoperiod-sensitive.	April, 2015-Dec., 2015
6.2	Evaluation of BRRI photosensitive varieties suitable for delay planting	Yield reduction was neglagible for BRRI dhan54(1.88%), but moderate for BRRI dhan44 (37.1%). However, it was lower for BR22, BR23 and BRRI dhan46 which were 13.79, 16.39 and 21% respectively	July, 2015-Nov., 2015
6.3	Physiological dissection of growth behavior and allied high yielding traits of three best varieties in the Boro season	Grain yield was significantly higher in BRRI dhan29 (6.47 t/ha) than BRRI dhan28. Contribution of primary tiller to grain yield was recorded 50.78 and 57.13 % in BRRI dhan28 and BRRI dhan29 respectively.	Dec., 2015-April, 2016
6.4	Characterization of Aus rice germplasm as affected by apical dominance	Germplasm Dhala Saita flowered early (57 days) with 33 days of grain filling period. At conventional line sowing condition six germplasms (Morichboti, Pan Bira, Shitki Saita, Baila Bokri, Kataktara and Kachilon) yielded higher than check varieties but showed lodging tendency. Other five germplasms (Pukhi, Surja Mukhi, Kala Manic, Sukhti and Juma) had higher yield (>50%) after breaking of apical dominance than conventional planting.	April, 2015-August, 2016
6.5	Determination of growth stages of some rice varieties as affected by sowing time during Boro season	Growth duration of all varieties reduced from 20 to 21 days with one month delay of sowing time. Grain yield reduction due to late sowing was recorded more in BRRI dhan69 (31%), while it was about 20% for BRRI dhan67 and BRRI dhan68.	Oct., 2015-Oct., 2016
6.6	Investigation of CO_2-responsive genotypes from Bangladeshi rice germplasms through	Considering the ranking of responses of all genotypes for total dry weight, panicle dry weight, panicle number, total tiller and harvest index, top ten ranked genotypes	2015-2017

	planting geometry pre-screening technique	were selected for further evaluation in replicated trial.	
Project 7: Crop Weather Information			
7.1	Automatic weather station data recording, transfer, storage, provide and maintenance	Collection, storage and provide of automatic weather station data for 2015-2016 is on-going.	2015-2016
7.2	Manual weather station data recording, storage, provide and maintenance	Collection, storage and provide of automatic weather station data for 2015-2016 is on-going	2015-2016

Soil Science Division

Research Progress 2015-16

Research Progress	Expected output
1. Project: Fertility assessment of rice soils and nutrient use efficiency in rice (open)	
Expt. 1.1. Determination of N P K fertilizer doses through SSNM for ALART materials T. Aus 2015 In T. Aus 2015, BR26 and Nerica mutant produced significantly higher grain (2.58 and 2.57 t ha^{-1} respectively) than BRRI dhan48 (2.34 t ha^{-1}) and BR7718-55-1-3. Nerica Mutant required 39 kg N, 8 kg P and 18 kg K ha^{-1}. T. Aman 2015 In T. Aman 2015, BB, DR genotype BRC245-4-19-2-1 needed only 31 kg N, 7 kg P and 35 kg K ha^{-1};MER genotypes, BR8143-15-2-1 produced the highest grain yield (5.82 t ha^{-1}) and required 98 kg N, 10 kg P and 44 kg K ha^{-1}; RLR genotypes, NERICA-L-32 produced the highest grain yield (4.26 t ha^{-1}) and needed 83 kg N, 3 kg P and 46 kg K ha^{-1}; IR77092-B-2R-B-10 salttol. genotype produced highest grain yield (6.26 t ha^{-1}) with NPK requirement of 74, 10 and 20 kg ha^{-1} Boro 2015-16 In Boro 2015-16, BR (BIO)8072-AC8-1-1-3-1-1 lines out yielded BRRI dhan28 produced the highest grain yield (5.81 t ha^{-1}) with NPK requirement of 127, 10 and 47 kg ha^{-1} which was higher than BRRI dhan28; BR(BE)6158RWBC2-1-2-1-1 gave significantly lower yield than check BRRI dhan29 But NPK requirement of this line (80, 7 and 40 kg ha^{-1}) is lower than the check; N requirement of favorable Boro rice genotype BRRI dhan29-SC3-18-16-10-8-HR1(com) are lower than the check and BR7358-5-3-2-1-HR2(com) line needed the lowest amount of N and K; Micronutrient enriched genotypes out yielded the check variety BRRI dhan28 while BR7831-59-1-1-4-3-1-7-P2 line needed only 81 kg N and 55 kg K ha^{-1} with a yield of 8.12 t ha^{-1}; The	Optimum fertilizer doses

green super rice line HHZ6-SAL3-Y1-SUB2 produced the highest grain yield (8.00 t ha^{-1}) NPK requirement of 178, 9 and 52 kg ha^{-1} which was higher than the check BRRI dhan58; the high yielding rice lines BRRI dhan29-SC3-8-HR1(com) and BRRI dhan29-SC3-28-16-15-HR2(com) out yielded BRRI dhan28. BRRI dhan29-SC3-8-HR1(com) produced the highest grain yield (7.30 t ha^{-1}) followed by BRRI dhan29-SC3-28-16-15-HR2(com) (7.28 t ha^{-1}). N requirement of both lines are 178 kg ha^{-1} while P requirement of BRRI dhan29-SC3-8-HR1(com) was lower (17 kg ha^{-1}) and K requirement was higher (49 kg ha^{-1}) than BRRI dhan29-SC3-28-16-15-HR2(com).	
Expt.1.2.Effect of nitrogen and potassium rates on modern rice cultivation A combination of 50 kg K and 75 kg N ha^{-1} for T. Aman rice (BRRI dhan49) and 50 kg K ha^{-1} and 100 kg N ha^{-1} for Boro rice (BRRI dhan29) cultivation seems to be suitable for desired grain yield of rice in grey terrace soil. In T. Aman 2015, the highest P uptake was recorded with 50 kg K ha^{-1} (18.65 kg ha^{-1}) and 100 kg N ha^{-1} (19.93 kg ha^{-1}). On the other hand, the highest mean K uptake (137.69 kg ha^{-1}) was recorded with the highest K rate and 75 kg N ha^{-1} (103.74 kg ha^{-1}).	A suitable ratio of N and K nutrients for rice cultivation
Expt. 1.3. Appropriate N and K dose for targeted rice yield under AWD situation In AWD condition, grain yield in BRRI dhan57 and BRRI dhan65 could be increased with the additional (25% more than recommended dose) N and K application while recommended dose is enough for desired yield of BRRI dhan56 and 66. In Boro season, additional NK application could not improve the grain yield of IR83140-B-36-B-B, IR83142-B-71-B-B and BRRI dhan29 while 25% additional NK application significantly increased grain yield of BRRI dhan28.	Optimum fertilizer doses under AWD conditions
2. Project: Identification and management of nutritional disorder	
Expt. 2.1.Long-term effect of some macro and micro nutrients on yield and nutrition of low land rice (Open) Long-term omission of N, P, K adversely affected rice yield though S and Zn omission had no negative effect on rice production in Grey Terrace soil of BRRI farm, Gazipur. Long-term application IPNS based chemical fertilizer showed increasing trend of rice yield, while inorganic fertilizer alone showed yield plateau. Among the organic materials, PM performed better in both seasons. Intensive rice cropping without fertilizer reduced grain yield of Boro rice to 0.50 t ha^{-1}. The trend in grain yield with NPKS fertilization over 36 years showed a positive increment compared to base year (1985). Soil productivity can be recuperated to its original state by addition of complete fertilizer dose. The STB fertilizer dose and INM could be good options for higher grain yield of rice in double or triple rice cropping pattern. Nutrient uptake (kg/ha/season) was higher in double cropping than triple rice cropping.	Long-term yield trend as well as soil fertility status

Expt. 2.2. Effect of intensive rice cropping on rice yield under continuous wetland condition (Open) An experiment on continuous wetland rice culture is initiated since 1981 at BRRI, Gazipur. Grain yield in control plot was 0.52-2.01 t/ha irrespective of season during 2013-14. In 2014, annual rice production in control plot was 4.25 t/ha. However, its reversed management (addition of NPKSZnCu fertilizer) resulted in 11.98 t/ha/yr grain production, which was similar to complete fertilizer treatment (12.29 t/ha/yr). It indicates that complete fertilization can recuperate soil productivity even after a long period of rice cultivation. Results indicated that additional use of Cu is not necessary for rice production.In Boro 2014-15 season, grain yield of BRRI dhan50 was only 0.50 t/ha, which increased up to 4.32 t/ha with NPKSZn fertilization.	Yield trend and nutrient depletion pattern
Expt. 2.3. Integrated nutrient management (INM) for double and triple rice cropping pattern for maximizing yield and sustaining soil fertility (Open) This experiment was initiated during 2008/09 Boro season at BRRI, Gazipur having variable nutrient management options. Boro 2014-15 In Boro 2014-15, under double cropping pattern both STB dose and 50% STB + mixed manure (MM) produced significantly higher grain yield than farmers' practice (FP). However, STB dose and 50% STB + mixed manure (MM) produced statistically similar grain yield in this season under double and triple cropping pattern. The highest grain yields of 5.78 t/ha and 5.59 t/ha were obtained with STB under double and triple cropping pattern, respectively. T. Aus 2015 The highest grain yield (1.90 t/ha) of BRRI dhan43 was found in 50% STB + MM treatment which was statistically similar with STB dose (1.79 t/ha). T. Aman, 2015 In T. Aman 2015, under double cropping pattern both STB dose and 50% STB + mixed manure (MM) produced significantly higher grain and straw yield than farmers' practice (FP). However, the highest grain yield (4.73 t/ha) was found with 50% STB + MM. Under triple cropping pattern the highest grain yield (3.79 t/ha) was found with 50% STB + MM which was statistically similar with STB dose. It may be concluded that STB(100%) dose of fertilizer and integrated nutrient management (INM) are good options for obtaining higher rice yields in double or triple rice cropping pattern. Annual yield in 2015 STB dose gave the highest annual rice yield of 9.76 and 10.20 t/ha under double and triple rice cropping, respectively. However, 50%STB+MM gave more or less similar annual grain yield of 10.60 and 11.66 t/ha under double and triple cropping pattern, respectively. Boro 2015-16 Similar with Boro2014-15, under double cropping pattern both STB	Integrated fertilizer management for sustainable yield and soil fertility

dose and 50% STB + mixed manure (MM) produced significantly higher grain yield than farmers' practice (FP). However, STB dose and 50% STB + mixed manure (MM) produced statistically similar grain yield in this season under double and triple cropping pattern. The highest grain yields of 5.13 t/ha and 5.22 t/ha were obtained with STB under double and triple cropping pattern, respectively.	
Expt.2.4. Validation of BRRI fertilizer management technology (Boro, T. Aus and T. Aman rice) BRRI recommended fertilizer dose and IPNS based chemical fertilizer maximized rice yield and it might have improved soil health. Application of organic materials (RS/CD/PM) with IPNS based chemical fertilizer can substitute major portion of P, K and S fertilizer. Organic material applied with IPNS based chemical fertilizer was a good practice to maximize rice yield in both tidal flood ecosystem and submergence and cold prone areas. It also reveals that application of organic material can substitute the use of chemical fertilizer. Organic manures also improve the soil health.	Dissemination of fertilizer management technologies among the farmers.
Expt.2.5. Performance of vermicompost and poultry manure on rice yield and soil health Poultry manure and vermicompost at 0.5 Mg ha^{-1} with full doses of chemical fertilizers could be used for sustaining rice productivity and paddy soil health.	Rate of poultry manure and vermicompost for optimum yield
Expt. 2.6. Performance of MV Rice under Phosphorus Deficit Conditions BRRI dhan49 produced higher grain yield than BRRI dhan29 with same soil P levels under P deficient condition. Under soil P deficient condition, K concentration in rice straw decreased but grain K concentration increased with the increase of soil P level.	P efficient rice genotypes will be identified.
Expt. 2.7. Climate Smart Agricultural Practices for Crop Production in Bangladesh About 50% of recommended fertilizer dose can be reduced for Boro rice if mustard crop is grown under standard practices. Greenhouse gas emission can also be reduced because of mustard and short duration rice variety cultivation.	Fertilizer dose for mitigation of greenhouse gas emission
3. Project: Greenhouse gas (GHG) emission study **Expt.3.1.Greenhouse Gas (GHG) emission trial at BRRI** No additional yield advantage was recorded from deep placement of N as UDP and NPK briq during T. Aman, it could save N by 25-50% without yield penalty. In contrast, UDP and NPK briq compared to PU significantly increased rice yield and RE_N and it could also save N by 25-50% when compared with PU in Boro season. Floodwater $NH4^+$-N were significantly higher in PU over UDP and NPK briq in both T. Aman and Boro season. Similarly, UDP significantly reduced NH_3 volatilization than that of PU in both seasons. Cumulative N_2O-N fluxes were higher in PU treatment during T. Aman 2015 in AWD condition, while in Boro season 2016 both UDP and PU showed similar cumulative N_2O-N fluxes. Negative NO fluxes were observed	Option for mitigation of GHG emission

in T. Aman season, whereas insignificant fluxes among the treatments was observed in Boro season under AWD condition.	
4. Project: Evaluation of new fertilizers	
Expt.4.1. Performance of NEB fertilizer onBoro rice NEB had no effect on Boro rice yield.	New fertilizer
5. Project: Soil Management for Unfavorable Ecosystems	
Expt. 5.1.Effect of gypsum on soil salinity and rice yield in coastal areas. In saline soil at farmer's field of Kalapara, Patuakhali, application of gypsum with farmer's fertilizer dose could not influence the growth and yield of BRRI dhan47. This might be due to the lower fertilizer dose of the local farmers.	Gypsum dose for rice cultivation in saline soil.
Expt. 5.2. Evaluation of salt tolerant rice varieties in salt affected soil BRRI dhan67 fully damaged at 12 dS m^{-1} whereas BRRI dhan28 fully damaged at 10dS m^{-1}. Transplanting of older seedlings (74-day old) BRRI dhan28 produced about 3.0 t ha^{-1} grain yield at 8dS m^{-1} salinity. At the same salinity Forty-four-days old seedlings of BRRI dhan67 produced about 2.5 t ha^{-1} grains.	Salt tolerant rice variety
5. Project: Soil Microbiological Studies	
Expt.5.1. Influence of fertilizer management on microbes and soil health The highest bacterial population was found in cowdung and poultry manure amended treatment followed by complete fertilizer treatment.Free living N_2 fixing bacterial population was higher than phosphate solubilizing bacteria.There was significant variation in bacterial population found according to soil depth. Mostly higher bacterial population concentrated 0-20 cm depth.	Nutrient release patterns as an indicator of soil health
Expt.5.2. Effect of long term nutrient management on microbial growth at variable soil depth Total and beneficial microbial population determined from different soil depth (0-100) of long-term missing element experiment.In the complete fertilizer treatment, total microbial population was higher up to 0-21 cm depth, while in poultry manure amended treatment, it was high up to 56-81 cm depth. The lowest population was found in the control treatment.In poultry manure treatment, PSB population was higher (up to 56-81 cm depth) than control and complete treatment, while free living N_2 fixing population was high in complete treatment.About 4×10^7 anaerobic bacteria population was found in 61 -100 cm soil depth.	Beneficial microbial population as an indicator of soil health
Expt.5.3. Formulation and evaluation of multistrain biofertilizer for rice production Compost prepared with urban waste (95%) + rock phosphate (5%) is environment friendly. Use of 1 t ha^{-1} of mature compost had potential to supply 100% P and 25% K for rice production. In the Net house, tested all bio-organic fertilizers performed well with 25% less chemical fertilizers (NPKS) and exhibited 12%, 31% and 60% higher tiller,	Biofertilizer for rice yield

panicle, and filled grain, respectively, compared to full (100%) chemical fertilizer treatment. N_2 fixing and phosphate solubilizing bacteria was high in bio-organic amended treatment throughout the growing season.	
Expt.5.4. Isolation and characterization of plant growth promoting bacteria from saline and acidic soil Total microbial population was determined from acidic soil (pH, 5.0).Two types of free-living N_2 fixing bacteria was isolated form acidic soil (pH, 5.0).Isolation and enumeration of saline soil bacteria is in progress.	Beneficial microbes
Expt.5.6. Bioremediation of Arsenic contaminated paddy soils Isolation of arsenic resistant bacteria is in progress	Arsenic resistant bacteril strains

Entomology Division

Research Progress: 2015 –16

Sl. no	Programme area/Project with duration	Expected output
1.	Project : Survey & Monitoring of Rice Arthropods	
	1.1 Arthropod monitoring in BRRI Farm Incidence of rice insect pests and their natural enemies along with their damage intensities was monitored weekly at BRRI farm Gazipur. Data collected from five different habitats (seed bed, rice-ratoon, grass fallow, upland and irrigated rice,) in Aus, T. Aman and Boro seasons 2015-16. Overall insect pest incidence was low in the reporting year. Grasshopper (GH), stem borer (SB), long horned cricket (LHC), whorl maggot (WM) and rice leaffolder (RLF) were the most abundant pests. In Aus 2015, GLH was the dominant pest in upland rice. GH was dominant in rice ratoon and irrigated rice. GLH was dominant in Boro seedbed and also in irrigated rice in T. Aman season. Spider, damselfly, lady bird beetle (LBB) and carabid beetle were the dominant natural enemies in all the habitats.	Insect pests and natural enemies will be monitored from different rice habitats in a long term and will be developed some models for forecasting.
	1.2 Insect pests and natural enemies in the light traps Rice insect pests and their natural enemies were monitored by using light traps during July 2015 to May 2016 at BRRI farms in Gazipur, Barisal, Rajshahi, Comilla and Sonagazi. Yellow stemborer (30,540) were higher followed by brown planthopper population (25,525), green leafhopper (22,228) and white-backed planthopper (17,143) in all five locations. Brown planthopper dominated (23,396) in Gazipur, yellow stemborer (19,842) and green leafhopper (14,513) in Barisal. Among the natural enemies green mirid bug, spider and carabid beetle were most prevalent. Highest population of	Number of insect pests and natural enemies will be monitored throughout the year and update the existent database. Also, incidence and peak abundance will be determined.

	green mirid bug (19,222) was observed in Gazipur.	
	1.3 Construction of epidemiology information interchange system for migratory disease and insect pests of rice *Monitoring of planthoppers in light trap* Winged adults of BPH and WBPH were trapped in light trap. Yearly incidence of planthoppers differed among different locations. Highest number of winged adults of BPH and WBPH were trapped in Gazipur followed by the catches of Sagordi farm (Barisal), Dobila and Washin (Tarash, Sirajganj). BPH and WBPH population build-up started from the 1st week of October 2015 and peak incidence occurred during 4th week of October and again in 3rd week of April to the middle of May 2016 at Dobila, Tarash upazila. The number of WBPH was higher than BPH and it was peak in 3rd week of November 2015 and 2nd week of May 2016. In Sagordi farm, Barisal, the peak incidence of BPH and WBPH was recorded in the 2nd week of October 2015 to the end of November 2015. Among the natural enemies, green mirid bug (GMB) population was considerably higher in BRRI HQ, Gazipur than Barisal, indicating their density dependence with BPH population build-up. *Monitoring of planthoppers by yellow sticky trap (YST)* Monitoring by yellow sticky trap during T. Aman 2015 indicated that the rice planthopper incidence started from 3rd week of September at Kanchaneswar, Kasta and Aurangail in Tarash upazila. Peak incidence was found on November 4 at Aurangail and that was from October 7 to November 4 at Kanchaneswar and again highest on November 4 at Kasta then decreased until harvest of the crop except Kanchaneswar (for BPH) due to the absence of natural enemies. Among the natural enemies, GMB population was higher in Kasta on November 11 catches. Spider population was almost similar during the observation period. In Boro 2016, BPH and WBPH population tended to increase at Dobila, Hamkuria and Washin from the 4th week of March and the peak population was in the 3rd week of April 2016. Spider population was observed in lower number during this season. *Monitoring of planthoppers by aerial YST* RPH (BPH, WBPH and SBPH) and natural enemies (GMB and spider) were more active in the Boro seedbed at Dobila followed by Hamkuria and Washin. Higher number of insect was caught at 2.44 m height traps than the other one. So,	Forecasting of rice planthoppers (RPH) and their monitoring system to farmers as well as to extension personnel. Accurate identification techniques of RPHs at field condition will be enhanced. Finally, the LAMP technology for RPHs and rice virus species established and applied in fields.

	aerial movement of RPH was higher in Dobila followed by Hamkuria and Washin. *Farmers Training* Based on the monitoring information and research findings, day-long training programs for 100 farmers (30 farmers per batch per day, comprising 48 project commanding and 52 surrounding farmers of the project) on rice insect pest management emphasizing on rice planthopper (RPH) were organized, at Madhainagar and Dobila union parishad auditorium under Tarash upazila. Upazila Agriculture Officer, SAPPO and the respective block SAAO's, Union Parishad Chairman were participated and shared the information in the day-long training programs. *Establishment of Insect Identification and Preservation Room* An insect identification and preservation room was established at Entomology Division, BRRI to identify the light trap and field collecting insect at its genus or species level. For this, Asian Food and Agriculture Cooperation Initiative (AFACI), Rural Development Administration (RDA), Korea provided fund to purchase the necessary equipments (like Research stereo microscope with digital camera, laptop, data reserve bank, DSLR camera, yellow sticky traps preservation chamber, insect identification kits, glassware's, chemicals and other apparatus etc) to address the problem. Therefore, an insect identification and preservation room is furnished in Entomology Division, BRRI to accelerate the project activities in Bangladesh. *Planthopper sample collection and delivery* Around 100 air dried samples of RPH (BPH, WBPH and SBPH) are now ready to sending Korean Principal Investigator for molecular analysis. *RPH forecasting and management* Seasonal occurrences of RPH are known for T. Aman and Boro season rice which is helpful in prediction of outbreaks of RPH. Farmers in the project area have been informed earlier about the incidence of RPH. Thereby, Extension workers can apply suitable management practices to manage RPH at appropriate time. Uploaded data in AMVIS website fascinate us on the RPH incidence and their outbreak in the project implementing countries in Asia Information on outbreaks of RPH shared among the member countries in Asia through the internet platform of AMIVS which is helpful in prediction of possible outbreaks of RPH among member countries.	

	1.4 Pests and natural enemies survey and monitoring in Gopalganj, Pirojpur and Bagerhat (PGB project) The insect pests and natural enemy (NE) population dynamic in rice landscape was assessed at maximum tillering stage of rice crop during Boro 2016 at Rotab of Jhalkati, Kaliarghob and Paramandasha of Barisal Districts. The number of insect pest population was low and had no effect on rice crop. The fields were also tracked up to harvesting stage in order to detect the significant number of pest population emerged after data recording. The investigated field did not show any visual field damage due to insect pests. But the number of NE population varied among the surveyed area and their population dynamic was recorded. Population of spider, green mirid bug, carabid beetle and staphylinid beetle were significantly different in rice landscapes.	Insect pests and natural enemies will be recorded from rice field and data will be used to develop forecasting model.
2	Project: Studies on rice insect pest and natural enemy bio-ecology	
	2.1 Conservation of natural enemies through ecological engineering approaches The experiment was conducted in BRRI H/Q and BRRI R/S Rajshahi during T. Aman, 2015 and Boro, 2016 seasons respectively. The experiment were conducted in a large field divided in to three block and each block divided in to 4 plots. Nectar-rich flowering plants (marigold, cosmos, sunflower, sesame) were planted on bunds of each 4 plots of the first block to provide food and shelter for different parasitoids. Insect pests and natural enemies counted from one and four meter away from the flowering plants and treated as T_1 and T_2 respectively. Prophylactic use of insecticide was done (carbofuran 5G@10.0kg/ha) at 15 days interval (4 times) in the 3^{rd} block after 1^{st} top dressing of urea fertilizer and treated as T_3. Normal cultivation was done in the 3^{rd} block except no insecticide and no flowering plants treated as T_4. Twenty complete sweeps were taken from all the blocks every 15 days interval up to flowering. Insect pest and natural enemies number of all sweeps from different blocks were counted and recorded separately. Yellow stem borer egg parasitism was determined through retrieval method. *Gazipur* In T. Aman season, the highest number of grasshopper (GH) and leaffolder were found in T_1 (4.25 and 4.00 per 20 complete sweep respectively). But the incidence was below the economic threshold level. In case of natural enemies, highest number of spider (2.00 per 20 complete sweeps) was found in T_1. In Boro 2015, the results showed that highest number of yellow stem borer (YSB) and grasshoppers were	The use of insecticide will be reduced at the early crop stages by enhancing the buildup of different natural enemies in rice agro-ecosystem.

	found in T_3 (4.66 and 10.00 per 20 complete sweeps respectively) where no nectar-rich flowering plants were planted around the plot. In case of natural enemies, higher number of spider and green mirid bug were found in T_1 (13.00 and 2.00 per 20 complete sweeps respectively). Green mirid bug population was not found in insecticide treated plot. This result indicates that flowering plants induce natural enemy's population in rice field. Egg bait trap was used to determine the effect of flowering plant for natural enemy's activity against insect pests. The lowest parasitism of BPH egg was observed where insecticide was used continuously (24.67%) and higher number of parasitized egg was found in T_1 treated plot (56.32%). *Rajshahi* The highest number of green leafhopper, rice leafroller (RLR) and YSB were found in T_4 (9.5, 1.25 and 1.25 per 20 complete sweep respectively). But the incidence was below the economic threshold level. In case of natural enemies highest number of spider, lady bird beetle (LBB), carabid beetle, staphylinid beetle, damsel fly (Dam. fly) and dragon fly (12.5, 11.5, 1.5, 2.75, 9.25 and 0.75 respectively per 20 complete sweep) were found in T_1. In T_3, insecticide was used four times (carbofuran 5G@ 10.0kg/ha) but yield was (5.40 t/ha) similar to that of T_1& T_2 (5.36 and 5.17 t/ha respectively) where nectar-rich flowering plants were grown in bunds surrounding rice crops. Lower yield (4.91 t/ha) was observed in T_4 where no insecticide applied and no flowering plants grown in rice bunds. Moreover highest YSB egg parasitism (25.48%) occurred by *Trichogramma chilonis* in T_1 followed by T_2 and T_3 (20.25 and 8.23% respectively). But no parasitism occurred in T_3 where continuously insecticide was used.	
3.	Project : Crop Loss Assessment	
	3.1 Effect of rice leaf folder damage on rice grain yield Randomly 100 rice hills with high levels of natural RLF damage and another 100 healthy hills were marked at the flowering stage in study field of T. Aman 2015 season. The number of healthy and RLF damaged leaves were counted at marking. At harvest, number of panicles was counted. Panicle weight and grain yield were measured and adjusted at 14% moisture content. Yield loss occurred in rice leaf folder infested hills compared to control hills in BR3 variety. Healthy hills bear heavier panicles and produced higher grain yield than the infested ones. Healthy hills also had higher number of panicles than the infested ones. By adjusting the panicle numbers between healthy and infested hills the yield loss was estimated at 16.08%.	The present status of rice leaffolder and its damage potential could be assessed. Thus a proper management strategy may be designed.

4.	Project : Evaluation of chemicals and botanicals against rice insect pests	
	4.1 Test of different insecticides against major insect pests A total of 38 commercial formulations of insecticides, received through the plant protection wing of DAE, were evaluated against brown planthopper (BPH) and yellow stemborer (YSB). Twenty five insecticides were found effective (24 against BPH and 1 against YSB). Effective commercial formulations were recommended to PTASC for registration and commercial use.	Effective insecticide (s) will be determined against major insect pests.
5.	Project : Integrated Pest Management	
	5.1 Validation of BRRI recommended practices for the management of major insect pests of rice (IAPP) Barisal: The experiments for insect pest management were assigned in four farmers' fields of Barisal region. One portion of each farmer's field was remained under the respective farmers' supervision without any intervention treated as treatment 3 (T_3). The other portion was managed with three treatment combinations i.e., T_1 – Prophylactic use of insecticide, T_2 – Perching+ Sweeping+ Need base insecticide application. BRRI dhan64 were transplanted during Boro 2015-16. The respective variety was grown in all the farmers' fields maintaining same seedling age and other agronomic practices. observed for insect infestation among the treatments. Dead heart was calculated in different treated field and significant difference was not found among the treatments. Rice bund of experimental plots was swept to record insect pests and natural enemies. Among the natural enemies spider (SPD), lady bird beetle adult (LBB), staphylinid beetle (STB), carabid beetle (CDB), dragon fly (Drag. fly), spider and damsel fly were found. Farmers also applied insecticide two times. Thus it was indicated that continuous use of insecticide has detrimental effect on the population of natural enemies. Treatment T_2 and T_3 refrained from insecticide use at the early crop stages (30 - 40 DAT). As a result SPD, LBB, STB and CBB populations found highest in T_2 during hill counting which might reduced pest population below the ETL level. More or less similar scenarios were also observed during sweeping. So it should be avoid indiscriminate use of insecticide at early crop stage (30-40 DAT) to conserve natural enemy in the rice field. There was no significant differences were observed among the treatments for grain yield. Most of the farmers in Barisal region avoid line sowing, perching, sweeping but applied at least two times insecticides.	Farmers will be benefited for controlling major insect pests of rice by using BRRI recommended practices.

	Moreover, no significant difference in yield was observed in other two treatments (T_1 and T_2). In T_1 Virtako 40WG (75 g/ha), was applied four times but no yield advantage was observed over the treatment T_2 and T_3 where perching and sweeping were done fortnightly and no insecticide was used. Therefore, it was found that continuous use of insecticide had no effect on yield and yield contributing characters of rice when insect infestation below the ETL. So, farmers could avoid continuous /indiscriminate use of insecticide which ultimately save production cost and save the environment from insecticidal pollution. Rangpur: The experiment was conducted in farmer's fields of Rangpur and Barisal regions. Treatments and other practices were same as Barisal region. In Rangpur region it was found that by using balanced fertilizer particularly avoid excessive use of urea, transplanting in line with standard aged seedlings, proper water and weed management, perching @ one/100m^2 for the insectivorous birds to sit on it and refrained from insecticide spray up to 30-40 days after transplanting (DAT) enhance the number of beneficial insects populations and spiders in rice field which help to reduce the harmful insect pests and thus protect the rice crop. Therefore, farmers could produce rice without insecticide or use of minimum insecticide i.e. by one application of insecticide without any yield reduction. Finally, farmers could avoid continuous/indiscriminate use of insecticide which ultimately save production cost and save environment from insecticidal pollution as well. It was also found that continuous use of insecticide has no effect on yield and yield contributing characters of rice when insect	
	5.2 Validation of BRRI recommended practices for insect pest management in Pirojpur, Bagerhat and Gopalganj regions (PGB) The experiment was conducted in farmers' fields of three locations of Pirojpur districts in Boro 2015-15. One portion of each farmer's field was remained under the respective farmers' supervision without any intervention treated as treatment 3 (T_3). The other portion was managed with three treatment combinations i.e., T_1 – Prophylactic use of insecticide, T_2 – Perching+ Sweeping+ Need base insecticide application. BRRI dhan64 were transplanted in all the farmers' fields maintaining same seedling age and other agronomic practices. Data of insect pest infestation were collected by 20 hills counting method and damaged score was calculated and presented here. During the experimental period insect infestation was below the	Farmers will be benefited for controlling major insect pests of rice by using BRRI recommended practices.

	economic threshold level (ETL) in all three locations. Percent dead heart was comparatively higher in farmers practices plots (1.11%) followed by T_1 (0.833%) and T_2 (0.55%) plot. Leaf folder infestation level was also below 1% and was slightly higher in need base insecticide plot (0.55%) than other two treatment plots (0.277% and 0.354% in T_1 and T_3 respectively). It may happen due to without insecticide application in T_2 plot. Lower yield was observed at T_3(5.79 t/ha) in all the three location of Nazirpur. Most of the farmers did not use perching. Differences in yield were observed in other two treatments (6.59 and 6.94 t/ha in T_1, and T_2 treatments respectively) in all the locations. In T_2, only perching and sweeping were done fortnightly or when necessary and no insecticide was used but no yield reduction was observed, but had some yield advantages than prophylactic insecticide used plot (T_1). Lack of proper water and weed management, inappropriate insecticide use at early stage might negatively affect the yield in farmers practiced plots. Insecticide (Virtako 40WG, 75 g/ha) was applied four times in Prophylactic insecticide used plot (T_1) but no yield advantage was observed. Therefore, it was concluded that continuous use of insecticide had no effect on yield of rice when insect infestation was below the ETL. So, farmers should avoid continuous or indiscriminate use of insecticide which ultimately save production cost and save the environment from insecticidal pollution.	
6.	Project: Host Plant Resistance	
	6.1 Screening of rice germplasm , advance line and F_2 materials against major insect pests A total of 129 entries were tested under controlled conditions in green house against brown planthopper (BPH), 91 against white backed planthopper (WBPH), during the reporting period. Out of 129 entries 30 were found moderately resistant against BPH. Among the 91 entries 29 were selected as moderately resistant against WBPH.	Resistant sources against major insect pests could be found.
	6.2 Screening of rice germplasm advance lines and F_2 materials against rice gall midge (GM) A total of 91 rice germplasm collected from Genetic and Seed Resource (GRS) and Genetic Plant Breeding (GPB) division were screened against GM during the reporting period from July 2015 to June 2016. In addition, the resistance materials found in previous year were also included in reporting year screening for more confirmation. Among 91 rice germplasm, BR8693-17-6-2-1 and Koha binni (Acc# 93/208) recorded as resistant (0-1% OS) whereas, Muktahar (Acc # 66/156), Safahar (Acc #10/368) and a cross combination “BR11/BRRI dhan33 (10768)” showed moderately susceptible (MR) (11-20% OS) reaction to GM at glasshouse condition.	Resistant sources against rice gall midge would be identified.

7.	Project: Vertebrate pest management	
	7.1 Study on the barn owl (*Tyto alba)* and their biology for sustainable rat management Owl watching towers were established at three heights: 8, 10 and 12 in different location of BRRI farm. Net is used to collect the owl regurgitated pelletes for analysis. Data showed that highest number of regurgitated pellets was collected from 10 feet height watching tower than the other heights. Highest number (108) of pellets was collected in the month of June followed by December and May and least number (36) of pellets was recorded in the month of Feb due to cold weather. This result indicates that 10 feet height is suitable for owl watching and preying in rice field rats. It is effective from dusk to down and can be used as perching device during day time. Collected and observed regurgitated pellets confirmed the rat predation by owl. Newly developed burrows become inactive around 10 diameter areas.	Rice field rat will be managed naturally with the barn owl as a biocontrol agent. Besides, pest and predator biodiversity will be conserved.

Plant Pathology Division

Summary Research Progress 2015-16

Sl. No.	Research Progress Program Area/Project: Pest Management (Plant Pathology)	Expected Output
1	Survey and monitoring of rice diseases in selected areas	Survey were conducted in both T. Aman 2015 and Boro 2015-16 at different locations such as Gazipur, Comilla, Chittagong, Rangpur, Rajshahi, Kustia, Nilphamar, Khulna, Barisal and Sylhet of Bangladesh. In the surveyed areas, bacterial blight, blast, sheath blight, brown spot, leaf scald and ufra were recorded. Among the diseases, blast disease was observed severe in different upazilla of Comilla district during Boro season and bacterial blight, brown spot and sheath blight diseases were found as predominant in T. Aman season.
2	Identification of new blast races across the country	A total of 125 blast samples were collected from the field of IR64. Four races such as U73-i7-k177-z-17-ta633; U73-i7-k177-z15-ta433; U73-i5-k177-z07-ta633 and U73-i7-k177-z15-ta433 were detected indicating high variability among *P. oryzae*.

3	Molecular characterization of bakanae causing fungi in Bangladesh	Bakanae infected samples were collected from Gazipur sadar, Habigonj and Comilla districts. A total of 45 isolates were isolated, purified and preserved.
4	Pathotypic and genetic diversity of *Rhizoctoniasolani* AG1-IA: Collection of infected samples and isolation of the pathogen	More than 100 samples of sheath blight were collected from Rajshahi, Rangpur, Gazipur, Satkhira, Kustia, Gopalgonj & Comilla districts. The pathogen was isolated and purified following standard protocol from 20 samples.
5	Evaluation of blast resistant multiline varieties of IR49830 in tidal non-saline ecosystem of Barisal	None of the lines were selected for further study as yield potentiality of these lines was not significantly higher than the check varieties. However, these lines showed some degree of resistance against rice blast disease in tidal non saline condition and, therefore, may be used as donor parent's in future breeding program.
6	Pyramiding of major Blast resistant gene(s) in susceptible rice variety/lines	Monogenic blast resistant genes *Pish*, *Pita-2*, *Pi9* and *Pi40* were introgressed separately in the mega variety BRRI dhan28 and BRRI dhan29 during Boro 2015-16. Further, BRRI dhan63 and Noyonmani was also considered as recurrent parent in which the above mentioned gene(s) were introgressed.
7	Screening for rice root knot (*Meloidogynegraminicola*) resistance (ADB Project)	A set of 13 rice genotypes were tested for resistance against rook knot nematode of which, IR 97153-B-55 was found to be resistant.
8	Screening of INGER materials, advanced breeding lines, breeding lines and germplasm against bacterial blight (BB) disease (TRB Project)	Out of 68 INGER materials, five materials showed moderately resistant reaction (MR) in T. Aman season, while 19 materials showed MR reaction in Boro season. In case of 65 advanced breeding lines, 12 showed resistant (R) reaction against BB, while seven showed moderately resistant (MR) reaction. Among the 12 lines of Biotechnology Division, nine showed moderately resistant reaction to BB.
9	Yield performance of selected BB resistance advanced lines	Two bacterial blight resistant advanced lines were selected during T. Aman, 2014. In T. Aman 2015, the selected lines were grown following head to row method and 34 plants were selected based on their phenotypic attributes and BB resistance reaction following artificial inoculation. Finally, after observing the segregation pattern and BB reaction, three (03) fixed lines resistant to BB were selected in Boro 2015-16.

10	Gene pyramiding for bacterial blight (BB) resistance	BRRI dhan28, BRRI dhan29 and a local improved variety were used as recipient parents while IRBB60 and IRBB65 were used as donor parents. Pathogenicity results showed that a good number of progenies of BC_4F_1 or BC_5F_1 developed from the crosses were resistant to the most virulent BB isolate BXO9.
11	Screening of INGER materials against blast diseases	Eight materials out of 63, IRBL9-W/RL IR08L216, IR09N127, IR09L324, IR10A121, IR10A231, IR11N239, and IRN313 showed moderately resistant reaction against blast pathogen.
12	Evaluation of advanced breeding lines against blast disease	Among the 48 tested materials, only three (BR8626-19-4-1-1, BR8626-19-5-1-2, BR7988-14-1-4-4—2) in favorable for Boro rice ; and one genotype enriched in micronutrient (BR8640-9-7-3) and another insect resistant rice genotype BR7987-31-2-4 showed moderately resistance to blast disease.
13	Development of tungro resistant variety	Aus variety BRRI dhan48 and BRRI dhan71 was crossed with Tungro resistant Matatag-1, IR6970-1-1-1-4-2, IR81244(Tw-16). A total of 290 F1 seeds were obtained from the crosses.
14	Rice false smut disease at different flowering times	The level of the disease remained low in the crops flowering before mid-October. The disease reached the peak on 5 November and ceased on 28 December of flowering. The relationships between the disease incidence and relative humidity or sunshine hours were significant.
15	Control of seedling blight and raising healthy seedling in tray	Polythene cover and soil management with NPK @ 2-3, 3-4 and 2-3 g/tray could be effective for raising good and healthy seedling.
16	Validation of healthy seedling raising technique at different regions	Two experiments were carried out during Boro 2015-16 at Rajshahi and Rangpur regional stations. There was no or minimum disease observed in both treated seeds and seedling sprayed with fungicides irrespective of trays or field over the locations. The seeds treated for 16 hours to 24 hours results no disease incidence. However, seeds treated for 12 hours or less produced minimum disease.
17	Reaction of BB in different nutritional status, Boro 2015-16	The results suggested that ZnO and MOP + Theovit reduced the disease development.

18	Effect of soil and seedling treatment on false smut disease development	So far, among the nine different treatments, treatment T_5 (seedling treatment along with twice foliar spray) produced the lowest number of infected tiller (13.33) followed by T_7 (20.66) and T_4 (23.66), while the highest number of infected tiller (62.33) was observed in control plot (T_9).
19	Chemical control of false smut disease of rice	None of the fungicides were found to be effective in controlling false smut being identical to the control treatment in terms of hill infection (%) and yield (t/ha). However, the effect of different fungicides on panicle infection (%) varied to some extent. The lowest degree of panicle infection (11.41%) was found with Cu Acetate.
20	Management of Kresek (*Xanthomonasoryzae* pv. *oryzae*) in rice seedlings	Among the chemical treatments, the lowest (16.33%) Kresek incidence was recorded when inoculated seedlings were dipped in Copper Hydroxide (2% w/v) solution for 30 minutes. Statistically identical results were found with Copper Oxychloride (2% w/v solution) and MOP (0.6% w/v solution).
21	Evaluation of new chemicals against bacterial blight disease of rice	Preliminary studies indicate that five bactericides controlled BB, however it needs to be confirmed further.
22	Evaluation of new chemicals against blast disease of rice	Among the 23 fungicides, only six successfully controlled rice blast disease.
23	Chemical control of grain spot disease in rice	Out of 7 fungicides, only two fungicides successfully controlled grain spot disease in rice.
24	Chemical control of sheath blight of rice	Out of 24 fungicides, four fungicides successfully controlled rice sheath blight disease.
25	Demonstration on integrated rice disease management and healthy seed production in farmers' field (IAPP project)	A total of 18 demonstrations were conducted, of which 9 in T. Aman 2015 season, and 9 in Boro 2015-16 season. In all cases, BRRI recommended practice successfully managed ShB, blast and BB disease than farmer's practice. Again, a total of 576 kg pure and healthy seeds was produced by farmers themselves following BRRI recommendation and preserved those seeds in plastic drum for future use.
26	Demonstration on integrated rice disease management of major rice diseases (PGB)	A total of 23 demonstrations were conducted for blast and sheath blight disease management in farmers' field at seven upazilas such as Gopalgonj sadar, Tungipara, Kotalipara, Kasiani, Nazirpir, Mollahat and

		Fakirhat in 2015-16. In all cases, BRRI recommended practices successfully managed both blast and sheath blight disease compared to farmer's practice.
27	Management of Sheath blight disease utilizing *Trichodermaharzianum* (PGB project)	There was no statistically significant variation among the treatments. However, the lowest sheath blight incidence (% RLH) was recorded with the compost treatment compared to other two practices. Again, the highest yield (6.56 t/ha, yield increase 29.13%) was obtained with compost application.
28	Identification of redeel worm and management package for minimizing yield loss (PGB Project)	The redeel worm was identified up to genus level as *Chyronomus sp*. (Phylum: Arthropoda, Class: Insecta). Preliminary studies on feeding mechanism revealed that it damages the young roots of rice plants in the early stage of seedling establishment and infested seedlings fail to uptake nutrient from soil and subsequently dry up and die. However, comparatively higher yield (6.98 t/ha yield; 11.5% yield increase) was recorded with insecticide treatment.
29	Training on Rice Disease Management during 2015-16 (PGB project)	A total of three farmer trainings were conducted at Kasiani, Mollahat and Gopalgong Sadar. A total of 90 farmers were trained during the training program. Participants gave opinion that the training improved their knowledge on rice disease identification and management.
30	Training on rice disease management and healthy seed production (Mujibnagar Project)	A total of 108 SAAO (Sub Assistant Agriculture Officer) were trained on rice disease management and healthy seed production in Kustia district under Mujibnagar project.
31	Demonstration on sheath blight disease management under field condition in Kustia region during T. Aman 2015 (Mujibnagar Project)	Three demonstrations were conducted during T. Aman 2015 in Kustia region. In all cases, BRRI recommended practice successfully managed rice sheath blight disease compared to farmer's practice.

Rice Farming Systems

Research Progress 2015-16

Sl. no.	Research progress	Expected Output
Programme Area: Rice Farming Systems		
01	1. Rice Farming Systems Division	
	Project 1: Survey on Cropping Patterns of Bangladesh One program has been executed. 1.1. Study on cropping pattern of Bangladesh and harnessing opportunities for improvement • Workshop has been executed in 41 districts of Bangladesh. Collected data are under process. Project 2: Development of Resource Conservation Technologies One experiment has been executed. 2.1. Evaluation of minimum tillage and crop residue retention in Wheat-Mungbean-T. Aman cropping system • Result showed that, EM (Establishment method) and CRR (Crop residue retention) had no significant effect on REY. Under ST (stripe tillage) at different rates of CRR, REY ranged from 11.22 t/ha to 9.77 t/ha. Under CT (conventional tillage) and SPT (single pass tillage) at different rates of CRR, REY varied from 10.99 t/ha to 9.92 t/ha and 13.17 t/ha to 9.96 t/ha respectively. Apparently T_5 (conventional), T_2 (50% wheat and rice, 100% mungbean) and T_4 (25% wheat and rice, no mungbean) under SPT perform better performance. Project 3: Development of Cropping Systems and Component Technologies for Favorable Environment (Irrigated condition) Ten experiments have been executed	Generation of information on land use, crops and cropping patterns, constraints and probable solution of crop production, scope and opportunity for intensification and diversification of agricultural production systems and GIS map of cropping patterns. Database on conservation agriculture will be generated and resource conserving technology will be developed.
	3.1. Development of Vegetable**s, fish and fruit** system in mini pond	Shallow depth mini pond system to maximize the food

	• Stocking density of monosex tilapia @ 2 and 1 piece/m^2 integrated with aeroid had released in the pond. Among the treatments T_1, T_2 and T_3 gave aroid stem yield @ 88.4, 80 and 66.5 t/ha with stolon yield of 10.4, 10, and 8.7 t/ha, respectively. Fish will be harvested after two months. Both summer vegetables, winter vegetables and papaya have been successfully grown on the surrounding dikes. Insects were controlled by using pheromone trap.	production will be developed.
	3.2. Long-Term Effect of Three Cropped Cropping Patterns on the Agro-Economic Productivity and Soil Health • In Gazipur 2014-15, during Boro season, Grain yield of BRRI dhan29 was 7.38 t/ha at Boro-Fallow-T Aman cropping pattern and BRRI dhan28 was 5.85, 4.59 t/ha under Boro-T Aus-T Aman and Potato-Boro-T Aman cropping pattern. Potato yielded 23.84 t/ha under Potato-Boro-T Aman cropping pattern. Maize and Mungbean yield was 8.37 t/h and 0.6 t/ha under Maize-Mungbean-T Aman cropping pattern. In three rice cropping pattern yield of Aus variety BRRI dhan48 was 2.89t/ha at Boro-T Aus-T Aman cropping pattern. Low yield occurred due to serious rat and bird infestation. Grain yields of Aman rice variety BRRI dhan49 were 4.74, 4.63, 4.70 and 4.80 t/ha under Boro-Fallow-T Aman, Boro-T Aus-T Aman, Maize-Mungbean-T Aman and Potato-Boro-T Aman cropping pattern. Highest REY (25.22 t/ha) was obtained from Potato-Boro-T Aman cropping pattern. Maize-Mungbean-T Aman (13.89 t/ha), Boro-T Aus-T Aman (13.43 t/ha) and Boro-Fallow-T Aman (12.18 t/ha) were statistically similar. During Boro 2015-16season, Grain yield of BRRI dhan29 was 6.14 t/ha at Boro-Fallow-T Aman cropping pattern and BRRI dhan28 was 5.11 t/ha , 4.77 t/ha under Boro-T Aus-T Aman and Potato-Boro-T Aman cropping pattern. Potato yielded 22.22 t/ha. Maize and mungbean yield was 6.38 t/ha and 1.56 t/ha under Maize-Mungbean- T Aman cropping pattern. BRRI dhan48 was 4.53 t/ha at Boro-T Aus-T Aman cropping pattern. Aman is in the field. Soil sample analysis is under processing.	Impact of improved cropping pattern in respect of productivity and soil health will be assessed.
	3.3. **Evaluation of maize intercropping with**	

	vegetables in maize based cropping pattern in Chuadanga • A study was conducted at farmer's field of Chuadanga Sadar, fromRabi 2015-16 to Kharif-II 2016 season.Five cropping patterns viz., Maize+Bushbean-Sweet gourd-T. Aman, Maize+Spinach-Sweet gourd-T. Aman, Maize+Potato-Sweet gourd-T. Aman, Maize+Red Amaranth-Sweet gourd-T. Aman and Maize+Coriander-Sweet gourd-T. Aman were evaluated along with the check Maize-Sweet gourd-T. Amanin RCB design with three replications. During Rabi season, there was no significant difference in maize yield among the treatments. Maize intercrops viz. bushbean, spinach, potato, red amaranth and coriander yield were 6.44, 12.65, 18.25, 4.87 and 3.25 respectively. There was no significant difference in sweet gourd yield among the treatments. T. Aman is in the field. 3.4. Development of high intensity Cropping Pattern for greater Kushtia • There was significant REY difference among the five cropping patterns. Maize+Potato-T. Aus-T. Aman gave the highest REY (18.36 t/ha) followed by Maize+Spinach-T. Aus-T. Aman (15.07) in Kushtia as well as Maize+Potato-T. Aus-T. Aman gave the highest REY (22.95 t/ha) followed by Mustard-Mungbean-T. Aus -T. Aman (19.95) in Meherpur district. On the contrary, lowest yield was found from Maize-Fallow-T. Aman cropping pattern which was 10.14 t/ha in Kushtia and 14.16 t/ha in Meherpur district.	Suitable maize intercropping system for higher income will be developed. Intensified profitable cropping pattern will be developed.
	3.5. Performance of different types of seed bed in Aman and Boro seasons • In Aman 2015, highest yield were found from Wetbed-1a (SD 40 g/m^2;TP at 30days), Wetbed-1b (SD 80 g/m^2;TP at 30days),Dry bed (TP at 30days), Floating (TP at 30days), Dapog-1 (TP at 15days), Dapog-2 (TP at 30 days seedling from second seed bed) and there were no significant variation among those different types of seedbed. Comparatively lower yield were found incase of Wetbed-1b (SD 80 g/m^2;TP at 30days) and Wetbed-2b (SD 80 g/m^2; TP at 50days) which were significantly different from above those type of seedbed. In Boro 2015-16, highest yield was	Comparative performance of different seed beds will be identified.

	found (6.81 t/ha) from Wetbed-2b (SD 80 g/m^2;TP 70 days) followed by Wetbed-1a (SD 40 g/m^2;TP at 40 days), Wetbed-1b (SD 80 g/m^2;TP at 40 days), Floating (TP at 40 days), Dapog-1 (TP at 20 days), Dry bed (TP at 40 days), Dapog-2 (TP at 40 days seedling from second seed bed) and Wetbed-2a (SD 40 g/m^2;TP at 70 days in boro). 3.6 Effect of fertilizer management on yield of double transplanted Aman and Boro rice under T. Aman-Boro cropping systems • There was significant yield difference among the treatments in T. Aman season. DT with removed seedling (100%) and 1st split urea in 1st transplanted plot gave highest yield (5.51 t/ha) where NT with 30 DOS yielded the lowest (3.27 t/ha). In Boro season, among the treatments there was significant yield difference. DT (BRRIdhan58) gave the highest yield (6.62 t/ha) and the lowest yield (3.24 t/ha) was obtained from 85 days old seedling (BRRI dhan58) and 18 days old seedling (BRRI dhan58) yielded 5.66t/ha. Where NT with 30 DOS, DT with removed seedling (100%) and 1st split urea in 1st TP plot & DT with removed seedling (75%) and full fertilizer in 1st TP plot yielded 4.86, 4.41 and 4.52 t/ha respectively which are significantly similar.	Optimum fertilizer management package for double transplanted rice will be developed.
	3.7. Validation of fertilizer management options for major crops in Kushtia region • Each of ten farmers of Jehala and Shuvorajpur block were selected for this trial during Boro 2015-16 season. Each farmer's field was divided into three parts to imply the treatments viz., BRRI recommended fertilizer dose, soil test based fertilizer dose and farmer's usual fertilizer dose. In Chuadanga, all the options gave similar grain yield in Boro season. Whereas farmers applied higher fertilizer dose compared to BRRI recommended and soil test based fertilizer managements. In Meherpur district, highest yield (6.82 t/ha) was obtained from FP and BRRI gave the lowest (6.52 t/ha). But there was no significant difference among the treatments. 3.8. Determination of fertilizer dose for Mustard-Boro-T. Aman cropping patterns	Recommended fertilizer package will be validated and the better option will be adopted Location specific recommended fertilizer

	• Fertilizer recommendation for individual crop is available, but cropping system based recommendation received scanty attention. In this circumstance, the present study was accomplished to determine the fertilizer requirements for Mustard, Boro, T. Aman in Mustard (BARI sharisha-14) – Boro (BRRI dhan28) - T. Aman (BRRI dhan57) cropping systems through omission plot technique. System based fertilizer recommendation for the tested crops have been calculated from one year completion data. The required doses of N, P, K for T. Aman, Mustard and Boro were 48.2, 1.42 and 0.25 kg/ha; 92, 24 and 34 kg/ha; and 105.8, 3.4 and 22.3 kg/ha, respectively. The experiment should be executed in more years for valid conclusion. 3.9. Inclusion of summer vegetables after Boro rice in Mustard-Boro-T. Aman cropping pattern • The experiment was conducted from Rabi 2015-16 to Kharif-II 2016 at BRRI, Gazipur. • The treatments were: CP_1=Mustard-Boro-Zero tilled gimakolmi-T. Aman, CP_2=Mustard-Boro-Tilled gimakolmi-T. Aman, CP_3=Mustard-Boro-Tilled summer radish-T. Aman, CP_4=Mustard-Boro-Tilled stem amaranth-T. Aman, CP_5=Mustard-Boro-Dibbled okra-T. Aman, CP_6=Mustard-Boro-Tilled okra-T. Aman, CP_7= Mustard-Boro-Minimum tilled Indian spinach-T. Aman and CP_8=Mustard-Boro-Tilled indian spinach-T. Aman. There was no significant difference in mustard and Boro yield. All the vegetables were not established due to heavy rainfall except gimakolmi and okra. The yield of zero tilled and tilled gimakolmi were 15.62 and 17.45 t/ha, respectively. The performance of okra was not found promising. The yield of dibbled and tilled okra were only 0.38 and 0.58 t/ha, respectively. T. Aman is in the field.	package will be determined for Mustard-Boro-T. Aman cropping pattern Development of four crop cropping pattern with the inclusion of summer vegetables
	3.10. Evaluation of BRRI dhan48 as late Boro rice in Mustard-Boro-T. Aman cropping system • The experiment was conducted at BRRI farm during Boro 2015-16. The treatments were: Factor A: Transplanting date (viz., 01 February, 10 February and 20 February), Factor B:Variety and	

	seedling age (BRRI dhan28 with 55 days, 45 days and 30 days old seedling and BRRI dhan48 with 30 days and 20 days old seddling). It was observed that the older seedlings of BRRI dhan28 gave significantly higher grain yield (5.04 t/ha) than the BRRI dhan48 transplanted at 01 February. But there was no significant difference among the treatments incase of 10 and 20 February transplanting. Project 4. Development of Cropping Systems and Component Technologies for Deep Water Ecosystem One experiment has been executed	Performance of BRRI dhan48 as late planted Boro will be identified.
	4.1.Improvement of relay cropping of Aman with jute in Wheat-Jute-Relay Aman cropping pattern in shallow deep water rice ecosystem • The average yield of Jute was 2.69 t/ha. In case of relay Aman, BRRI dhan39 gave significantly higher yield compared to other varieties. Onion and Black cumin data are under process. Project 5. Development of Cropping Systems and Component Technologies for Saline environment Two activities have been executed. 5.1. Evaluation of sunflower spacing under different gradient of salinity • Treatment were: spacing S1=75 cm X 45 cm, S2= 60 cm X 45 cm and S3= 45 cm X 30 cm following RCB design with six replication.The highest seed yield was found in the spacing of 60 cm x 45 cm in all the sites which were significantly higher than the recommended plant spacing of 75 cm x 45 cm. The lowest yield was recorded in the closest spacing 45 cm x 30 cm. The overall seed yield was lower in the trials as affected by unusual heavy rain during last week of February 2016 at grain filling stage. 5.2. Evaluations of agronomic options for increasing the productivity of Boro rice in saline soils • The tested treatments were: T_1= BINA dhan10,	Variety and fertilizer management will be identified for Wheat-Jute-Relay Aman cropping pattern Suitable sunflower spacing will be identified for different gradients of saline soil. Location specific salt tolerant variety and the benefit of the improved fertilizer dose will be demonstrated.

	DS: Dec. 05, TP: Jan 10, 2-3 seedling/hill, T_2= BINA dhan10, DS: Nov. 25, TP: Jan 10, 5-6 seedling/hill, T_3= BRRI dhan61, DS: Dec. 05, TP: Jan 10, 2-3 seedling/hill, T_4= BRRI dhan61, DS: Nov. 25, TP: Jan 10, 5-6 seedling/hill, T_5= BRRI hybrid dhan3, DS: Dec. 05, TP: Jan 10, 1-2 seedling/hill, T_6= BRRI hybrid dhan3, DS: Nov. 25, TP: Dec 30, 1-2 seedling/hill, T_7= BRRI dhan28, DS: Dec. 05, TP: Jan 10, 2-3 seedling/hill, T_8= BRRI dhan28, DS: Nov. 25, TP: Jan 10, 5-6 seedling/hill, T_9= BRRI dhan28, DS: Nov. 15, TP: Dec 20, 5-6 seedling/hill, T_{10}= BRRI dhan28, DS: Nov. 25, TP: Jan 10, 5-6 seedling/hill, 90 kg additional S/ha. The soil salinity of the experimental fields ranges 2.51-3.44 dS/m, 4.13-4.67 dS/m and 5.31-7.5 dS/m at transplanting, flowering and maturity stages, respectively. The highest grain yield (5.80 t/ha) was found in BRRI dhan61 with more number of seedling (5-6 seedling/hill) at normal planting dates (10 January) which was similar to BRRI hybrid dhan3 with 10 days earlier planting. The lowest grain yield was recorded in BRRI dhan28 with 2-3 seedling/hill at normal planting date (4.85 t/ha) which was significantly out yielded by earlier planting and or more number of seedling/hill.	
	Project 6. Development of Cropping Systems and Component Technologies for Non Saline Tidal environment Four activities have been executed. 6.1. Evaluation of musk melon intercropping with lentil in three crop system in tidal non saline ecosystem • Musk melon intercropping with lentil in Lentil-Jute-T. Aman cropping pattern was conducted at five dispersed farmer's field during 2015-16. Intercropping system gave 81% higher rice equivalent yield (23.21 t/ha) than the existing pattern. The gross margin of intercropping system was 167% higher than without intercropping system. 6.2. Development of three crop systems for medium high tide wetland non saline ecosystem • Inclusion of mustard, wheat, potato, lentil in	Feasibility of musk melon intercropping with lentil and

	Fallow-Jute-T. Aman cropping pattern under four different cropping systems was tested at four to twelve dispersed farmer's field during 2015-16. All of the three crop system produced significantly higher REY of 57% to 196% than two crop system of Fallow-Jute-T. Aman cropping pattern (8.98 t/ha). Potato-Jute-T. Aman cropping pattern gave higher REY of 26.61 t/ha among the tested patterns. Highest gross margin 183366/- was obtained from Potato-Jute-T. Aman cropping system.	potato will be identified for Rabi - Jute – T. Aman cropping pattern. Three crop system will be developed.
	6.3.Adaptive trial of BRRI rice varieties in Aman and Boro season • Seven cooperative farmers were selected to conduct the study. Newly released boro rice varieties were taken under this trial. In T. Aman season, BRRI dhan33, BRRI dhan44, BRRI dhan52, BRRI dhan56 and BRRI dhan62 gave 4.54, 4.50, 4.75, 4.55 and 3.76 t/ha grain yield in Nazirpur upazila. During Boro season, BRRI dhan55, BRRI dhan58, BRRI dhan60, BRRI dhan64, BRRI hybrid dhan3 and Khato bhojon gave 6.03, 6.91, 7.03, 6.08, 7.04 and 5.71 t/ha grain yield, respectively. 6.4.Demonstration of USG application in Aman and Boro rice • Uses of urea super granule (USG) were demonstrated in more than twenty cooperative farmers' field. All other cultural activities and fertilizer dose will be followed as per BRRI recommendation. BRRI dhan58, BRRI dhan60, BRRI dhan63, BRRI dhan64 and BRRI hybrid dhan3 were used in USG trial. Irrespective of varieties, more than 1.0 t/ha yield advantage was obtained from USG applied fields. Farmers' showed their interest to use the USG. Project 7. Development of Improved Cropping Systems for drought prone area One experiment has been executed. • 7.1. Evaluation of rice-based cropping pattern in partially irrigated ecosystem	BRRI HYV varieties will be adopted. USG uses in farmer's fields will be disseminated. Improved cropping pattern with suitable Aman variety for partially irrigated ecosystem will be developed.

	The treatments were five cropping patterns viz., Tomato (BARI hybridtomato-5)-Mungbean (BARImug-6)-DS Aman (BRRI dhan57) (CP_1),Tomato (BARI hybridtomato-5)-Mungbean (BARImug-6)-DS Aman (BRRI dhan56) (CP_2),Tomato (BARI hybridtomato-5)-Mungbean (BARImug-6)-DS Aman (BRRI dhan62) (CP_3), Tomato (BARI hybridtomato-5)-Mungbean(BARImug-6)-DS Aman (BRRI dhan39) (CP_4) and Tomato (BARI hybridtomato-5)- Mungbean (BARImug-6)-DS Aman (BRRI dhan33) (CP_5) were evaluated in RCB design with three replications. During Rabi 2015-16, there was no significant difference in tomato yield among the treatments. The yield of Tomato ranged from 19.08 to 24.0 t ha^{-1}. During kharif-1 2016, no significant difference was found among the treatments. The yield of mungbean ranged from 0.65 to 0.89 t ha^{-1}. Direct seeded Aman is in the field.	
	Project 8. Validation and delivery of cropping systems technology Two program have been executed. 8.1. Validation of improved cropping patterns for greater Kushtia • Seven farmers were selected in each block to conduct each improved cropping system trial. In each trial, a improved cropping pattern was tested against an existing cropping pattern. In case of improved cropping pattern Mustard-Boro-T. Aman, REY (13.10-15.03 t/ha) was significantly higher than the existing Boro-Fallow-T. Aman pattern (10.47-12.03 t/ha). In case of improved cropping pattern Potato-Boro-T. Aman, REY (24.15-34.29 t/ha) was significantly higher than the existing Boro-Fallow-T. Aman pattern (11.51-12.73 t/ha). In case of improved cropping pattern Maize-Mungbean-T. Aman, REY (16.11 t/ha) was significantly higher than the existing Maize-Fallow-T. Aman (12.80 t/ha). In case of improved cropping pattern Maize-Til-T. Aman, REY (14.56 t/ha) was significantly higher than the existing Maize-Jute-T. Aman (11.93 t/ha). In case of improved cropping pattern Potato-Mukhikachu-T. Aman, REY (39.53 t/ha) was significantly higher than the existing Boro-Mukhikachu-Fallow (30.81	Improved cropping pattern technologies will be validated and disseminated through the farmers.

	t/ha). Introduction of improved varieties caused significantly higher REY compared to existing variety in Lentil-Til-T. Aman, Wheat-Jute-T. Aman, Onion-T. Aus-T. Aman, Mustard-Boro-T. Aus and Lentil-Jute-T. Aman cropping patterns. In case of improved cropping pattern Lentil-Jute-T. Aman, REY (21.21 t/ha) was significantly lower than the existing Tobacco-Jute-Fallow (26.80 t/ha).	
	8.2. Development and validation of intensified cropping pattern for Northern region Four cropping patterns viz. Potato (Diamont, Cardinal)-Boro (BRRI dhan48)-T. Aman (BRRI dhan56), Potato (Granula, Cardinal)-Maize (NK-40)-T. Aman (BRRI dhan56), Potato (Granula, Cardinal)-Maize (NK-40)-T. Aman (BRRI dhan56) and Wheat (BARI wheat26)-Mungbean (BARI mug6)-T. Aman (BRRI dhan56) is bring demonstrated in Rangpur, Kurigram, Nilphamari and Lalmonirhat districts. In Rangpur, potato and maize yielded higher in proposed pattern comparing to existing pattern. In Kurigram shows potato yielded higher in proposed pattern comparing to existing pattern. In Nilphamari Wheat yielded higher in proposed pattern comparing to existing pattern. A recent wheat variety BARI Gom 27 used in improved pattern to replace existing variety pradeep. In Lalmonirhat potato yielded higher in proposed pattern comparing to existing pattern.	Improved cropping pattern technologies will be validated and disseminated through the farmers.

Agricultural Statistics Division

Research Progress-2015-16

S. N.	Research Progress	Expected output
1.	Project: Stability Analysis of BRRI varieties *1.1 Experiment/Study:* Study on G X E interaction of BRRI varieties (In collaboration with Pl. Breeding Div., ARD Regional Stations) *Research Progress:*	1. Stability index of BRRI varieties 2. Season, year and location-wise database on BRRI varieties

	T. Aman: Data collection is going on. Boro: Experiment is in the field.	
	1.2 Experiment/Study: Stability and Adaptability of BRRI Released Aus Varieties in Different Locations of Bangladesh (In collaboration with Agronomy Div. and BRRI R/S Satkhira, Rajshahi, Rangpur, Kustia & Barisal) *Research Progress:* Gazipur: Ruined by insects Satkhira: Ruined by heavy rainfall Barisal: Ruined by tidal water	1. Varieties having wide and/or specific adaptation to the environment 2. Stability index of Aus varieties.
2.	Project: Multivariate Analysis of BRRI Varieties *2.1 Experiment/Study:* Development and validation of producer and consumer preference model to rice varieties (In collaboration with Agril. Econ.Div.) *Research Progress:* For validation four districts data already been analyzed and partial results presented in Annual research review workshop 2014-15 and another four districts data collection is going on.	1. Factors determining producers' and consumers' preference to a rice variety. 2. Functional models describing producers', consumers' and producer cum consumer preference to a rice variety.
	2.2 Experiment/Study: Maintenance of Rice and Rice Related Variable Database *Research Progress:* Data is updating continuously & introducing important related data.	To enrich the database of rice and other cereal/non-cereal crops
3.	Project: Spatial database for BRRI varieties *3.1 Experiment/Study:* Impact Assessment of Climatic Factors on Rice Production in Bangladesh *Research Progress:* Data analysis is going on. It will present in	Assess the impact of climate factors on rice production of three crops using ARIMAX model.

	internal review workshop 2015-16.	
	3.2 Experiment/Study: Seasonal Weather Forecasting for Boro Rice Production in Bangladesh (In collaboration with Agri. Econ Div., Agronomy Div. and Plant Physiology Div.) *Research Progress* Experiment is in the field.	Enrich the technical capacity for crop management by seasonal weather forecasting.
4.	Project: Geographical Information System (GIS) *4.1 Experiment/Study:* Suitability mapping of newly released BRRI rice varieties (Collaboration with Pl. Breeding, RFS and Adaptive research Division) *Research Progress:* Suitability map of BRRI dhan62	1. A geo-referenced database of BRRI varieties. 2. Suitability maps for BRRI varieties.
5.	Project: Probability Mapping of Weather Variables *5.1 Experiment/Study:* Probability Mapping of Temperature (Maximum & Minimum) and Rainfall *Research Progress:* Mapping of Temperature (Maximum &Minimum), and Rainfall of 2013 already been completed and trying to collect data of 2014 from BMD.	1. Station wise probability curves of weather variables would be obtained 2. Surface maps for the estimates of weather variables in Bangladesh would be obtained
6.	Project: Information and Communication Technology (ICT) *Activity 6.:* Mobile Apps of RKB *Research Progress:* 1. The mobile Apps of Rice Knowledge Bank (RKB) is developed by our ICT skill	1. The mobile Apps of RKB is developed by our ICT skill manpower with the help of MCC. 2. Manage and maintain RKB through regular updating

	manpower with the help of MCC. 2. RKB is hosted to Google Play Store. 3. Manage and maintain RKB through regular updating with the information and documents.	with the information and documents
	6 .2 Activity: e-Tender System of BRRI *Research Progress:* 1. To host e-GP system software BRRI is already applied and will start all type procurement under e-GP system by December 2016.	1. Start e-Tendering system in BRRI. 2. Host e-tender software to CPTU server, after completing all tasks.
	6.*3 Activity:* Management Information System (MIS) of BRRI. *Research Progress:* 1. The MIS Software was setup to BRRI server. All scientists & Class 1 officers was connected to MIS Software through BRRI network. 2. Data entry of the 7 (Seven) modules has been already started in MIS Software. 3. ICT manpower gets Backup of MIS database every day after 5 PM.	1. Setup management information system to BRRI. 2. Send MIS data to BARC data bank through VPN.
	6.4 Activity: BRRI Web portal Management *Research Progress:* 1. The dynamic website (Web Portal) of BRRI is developed by our ICT skill manpower of ICT Cell, Agricultural Statistics Division. 2. BRRI website is hosted to Bangladesh Computer Council (BCC) server. 3. We have included Rice database, Weather database etc.	1. Add new features in BRRI web portal. 2. Increase hosting spaces.
	6.5 Activity: Management of BRRI Network and Internet connectivity. *Research Progress:* 1. We have already given internet connection in 300 computers. 2. We have increased internet bandwidth speed from 12 Mbps to 35 Mbps.	1. Bandwidth connectivity increase from 12 Mbps to 35 Mbps or more and distributes the bandwidth among client PC. 2. Manage and maintain BRRI internet connectivity.
	6 .6 Activity: Video Conference System of BRRI *Research Progress:* 1. ICT cell of Agricultural Statistics division will provide Video conference system	Create Skype account for all scientists.

	related support services such as setup Skype software, installation webcam and headphone etc.	
	6 .7 Activity: Digital Signature System of BRRI *Research Progress:* 2. BRRI has already implemented Digital Signature Certificate processing by CCA under Information & Communication technology (ICT) division of Govt. of Bangladesh. Also, ICT Cell of Agricultural Statistics division distributed *53 (Fifty Three)* digital signature certificate ofscientists and officers of BRRI. 3. It has arranged a workshop by ICT Cell for distributing digital signature certificate for scientists and officers of BRRI, where officials of CCA have staged.	1. Setup digital signature system to BRRI. 2. Develop digital signature system for all scientists and class-1 officers of BRRI.
	6 .8 Activity: Heritage of BRRI *Research Progress:* 1. We have created Heritage for all retired scientists, officers, staffs and all labours of BRRI as per requirement of the BRRI authority. 2. Heritage is updated regularly as per availability of information. It is a routine work.	1. Manage and maintain BRRI heritage. 2. Add all ex. Scientists, officers and Staffs in BRRI heritage.
	6 .9 Activity: Online Application System of BRRI *Research Progress:* 1. Introduce online recruitment system through "e-ASS". 2. Developed demo version of "e-ASS".	1. Develop "e-Application System Software (e-ASS)". 2. To host "e-ASS" under national data center server. 3. To manage and maintain "e-ASS" through regular updating of the information and documents.

Agricultural Economics Division

Research Progress for 2015- 16

Sl. No.	Research Progress	Expected output
	Sub-sub Program: I. Rural Institution & Economic Consequences	
2.1	Farm Level Adoption and Evaluation of Modern Rice Cultivation in Bangladesh Duration: July, 2015 - June, 2016 Progress: About 60% data collection and entry were completed	Variety wise adoption rate and constraints of different MVs and LVs be evaluated.
	Sub-sub Program: II. Production Economics	
2.2	Estimation of Costs and Returns of MV Rice Cultivation at the Farm Level Duration: July, 2015 - June, 2016 Progress: About 60% data collection and entry were completed	Profitability, factor and income share of MV rice cultivation be estimated.
2.3	Tracking of Climate Resilient Rice Varieties Developed by BRRI and its Economic Performances at the Farm Level Duration: July, 2014- June, 2017 Progress: Data collection has been completed and analysis going on.	Performance of stress tolerant rice varieties be evaluated.
2.4	A Comparative Economic Study on BRRI dhan29 and Hybrid Rice Production in Haor areas of Bangladesh. Duration: July 2015 to June 2016 Progress: About 70% data collection and entry were completed	Comparative profitability of BRRI dhan29 and Hybrid rice production in *Haor* areas be evaluated.
	Sub-sub Program: III. Rice Marketing & Price Policy	
2.5	Value Chain Analysis of Rice Bran and Bran Oil in Bangladesh: An Economic Investigation Duration: July, 2015 - June, 2016 Progress: Questionnaire developed and site selection completed. About 80% work have been done	Prospects and potential of rice bran oil in Bangladesh be evaluated.

Sub-sub Program: IV. Agricultural Policy & Development

2.6	Impact of Farmers Training on Rice Production Duration: July, 2015 - June, 2016 Progress: Questionnaire has been prepared along with collecting literature review. Check list for focus group discussion has been pre-tested.	Effectiveness of farmers' training will be evaluated.
2.7	Impact of Seasonal Credit on MV Boro Rice Cultivation in Some Selected Areas of Bangladesh Duration: July, 2015 - June, 2015 Progress: About 70% data collection and entry were completed	Utilization pattern and impact of agricultural credit on MV rice cultivation be evaluated.
2.8	Social Dynamics of Gender Role in Rice Value Chain and Decision Making at Grass Root level Duration: July, 2015 - June, 2015 Progress: About 65% data collection and entry were completed.	Gender role scenario in decision making and access to resource use be assessed.

Farm Management Division

Research Progress 2015-2016

Sl. No.	Research Progress	Expected output
	3.1. Project: Rice Production Management	
	• Expt. 1. The influence of seedling age on tiller production, yield and yield components of rice. The experiment is in the field.	Tiller number, yield and yield components may increase with decreasing seedling age.
	• Expt.2. Seed quality of different T. aman rice as affected by rainfed condition in ripening phase. The data are being processed.	Seed quality *i.e.* germination percentage, grain weight and seedling vigor may be affected due to rainfed or unavailable moisture during ripening stage.

	• Expt.3. Effect of quality seed and farmer's seed for seed production and; yield gap between quality seed used plot and farmers' seed used plots. The data are being processed.	Yield of farmers seed used plot may be lower than TLS and breeder seed used plots.
	• Expt. 4. Effect of tillage operation on the productivity and profitability of rice cultivation . Treatments: ➢ T_1= Normal cultivation practice in farm ➢ T_2= Applying herbicide followed by one ploughing by PT/HT and laddering ➢ T_3= Removal of straw/grass by hand and one ploughing The data are being processed.	There will be no significant yield difference but T2 treatment might be profitable.
	• Expt. 5.Effect of Fungicide and Water Stress on the Natural Incidence of Neck Blast (*Pyricularia Oryzae*) in Boro Rice. The data are being processed.	The study is expected to generate preliminary recommendation(s) to farmers regarding prevention of the natural incidence of neck blast disease through irrigation management. Recommendation on the use of new fungicide(s) to limit the likely occurrence of neck blast is another potential of this study.
	• Expt. 6. Effect of foliar spray of MOP and elemental S for spot free seed production. The data are being processed.	Recommended fertilizer and MOP spray at heading stage and 15 days after heading may be useful for spot free seed production.
	3.2. Project: Survey and development of data base for labor management	
	• Expt. 1. Monitoring the laborers' wages rate for rice cultivation around BRRI Farms. Data are being collected	The average wage rate through out the year may higher than last year

	3.3. Project: Management and utilization of land and other resources. • Ten activities were done on seed production, irrigation, drainage, beautification etc. These are the continuous routine activities	These are for the better outcome from farm land and researches.

Farm Machinery and Postharvest Technology Division

Research Progress 2015-2016

SI. No.	Research Progress	Expected output
	Programme area/ Project with duration	
1.	Project: Agricultural Machinery Development and Testing	
1.1	Design and development of Mini Combine harvester Duration:01.07.2014 to 30.06.2016	First prototype of mini combine harvester was fabricated under Public Private Partnership approach at Janata Engineering Workshop, Chuadanga. BRRI provide design, drawing, technical and financial support for study. The field capacity was 0.17~0.23 ha/h and fuel consumption was 3.50 to 3.80 l/h. Further improvement required for improvement of the machine.
1.2	Design and Development of a Single Row Conical Weeder Duration: 01.07.2014 to 30.06.2017	A push-pull type single row conical weeder was designed and fabricated in the FMPHT divisional research workshop. A preliminary test was conducted to find out mechanical faults. Float angle of the skid was considered as 25° which helps to make slippage of the rotor. There are 6 smooth and 6 serrated blades on the periphery mounted alternately on the rotor to uproot and burry weeds with traction and shear force when the rotors create a back and forth movement in the top of soil. The effective width of the conical weeder was found 103 mm.
1.3	Effect of settling period of soil on performance of Rice Transplanter	Two walking type and one riding type transplanter was evaluated for 24, 32, 48 and

SI. No.	Research Progress	Expected output
	Duration: 01.07.2011 to 30.06.2016	56 hours settling period of soil. In clay loam soil, 32 hours settling period was most suitable for operating riding type and two rows walking type rice transplanter while a settling period of 48 hours was suitable for operation of walking type four rows rice transplanter.
1.4	Performance Evaluation of BRRI Manually Operated Rice Transplanter Duration:01-07-2015 to 30-60-2018	A manual rice transplanter was fabricated at FMPHT research workshop. The performance test was conducted during *Boro* 2015 season at BRRI HQ research plot using 30 day's old (3-4 leaf) seedling of BRRI dhan28. The field capacity was found 0.033 ha/h at an operating speed 0.421 km/h. The transplanter successfully transplanted seedlings on an average hill-to-hill spacing 21 cm and 6 cm depth with 5-7 seedlings/hill. The missing and floating hills were observed 7.19% and 5.93% respectively. It was found that buried hill were 1.33/ m^2 during the operation.
1.5	Study the effect of N_2 application method on crop performance Duration: Aman/2014 season to Boro/2015 season	The performance of BRRI Prilled Urea Applicator was evaluated at farmer's field. BRRI prilled urea applicator saves up to 30% urea without scarifying rice yield. In addition, there is no obligation to maintain proper hill to hill distance because Prilled Urea Applicator drops urea continuously.
1.6	Development of BRRI Panicle Thresher Duration:01-07-2014 to 30-06-2016	BRRI developed panicle thresher capacity was 300 kg/h and kept the straw intact and also cleaning paddy simultaneously.
1.7	Modification and Evaluation of Closed Drum Thresher Duration: 01-07-2015 to 30-06-2017	New model of closed drum thresher was developed. The performance of the thresher is better than the existing model (TH-7). The modified thresher was an average threshing capacity 912 kg/h.
1.8	Test and evaluation of reaper binder Duration: 01-07-2015 to 30-06-	A reaper binder (Model: CF178F) was used to test and evaluate the performance for paddy harvesting. It has fixed cutting width

SI. No.	Research Progress	Expected output
	2018	of 60 cm with an adjustable cutting height of 7 - 35 cm from ground level. The crop was left aside after cutting at the right side of the machine. Observations on speed, width of cut, total time taken to cover the area and fuel consumption were recorded. It was observed that the actual cutting width of binder was 60 cm. The actual field capacity was 0.313 ha/h at an average operating speeds of 3.2 km/h. The average fuel consumption was measured at 657.50 ml/h. It was revealed that the machine can be able to cut the paddy at an average 8–35 cm height from ground level which was quite similar to traditional manual sickle cutting. The average diameter of the reaping bundle was found 10.09 cm and number of tiller was 190 per bundle. The overall performance of the reaper binder was quite satisfactory. As this reaper has binding facilities and overall field performance found quite good, so this reaper might have the potentiality using in farmers field until the period of fully introduced of combine harvester.
2	Project: Milling and Processing Technology	
2.1	Test, Evaluation and Modification of Rubber Roll de-husker Duration: 01-07-2015 to30-06-2017	BRRI modified rubber roll de-husker was evaluated to observe the hulling efficiency and capacity with the variety of BRRI dhan62 as un-parboiled condition. The hulling efficiency was about 90% and capacity was found 500 kg/h. Using brown rice from this husker in the engleburg huller increase 1-2% head rice recovery.
2.2	Improvement of air-blow type engleburg huller Duration: 01-07-2015 to30-06-2017	Modified air blowing type engleburg huller is fabricated only for parboiled rice. FMPHT division is trying to process un-parboiled paddy by reducing rotor rpm with different sizes of pulley. Pulley diameter 223 mm and rpm 811 gives good result for un-parboiled paddy. It is mentionable that clean rice can get by this machine in a single pass.

SI. No.	Research Progress	Expected output
2.3	Fabrication and installation of air blow type rice in farmer's field Duration:01-07-2014 to 30-06-2016	The existing engleburg steel huller rice mill was modified introducing a blower to suck the husk and barn from milled rice. Introducing a blower in the existing engleburg mill temperature reduced inside the mill and head rice recovery increased. The improved air blow type rice mill was fabricated at Jamtoly, Ashulia Saver and installed at farmers' house for long time use.A total of 12 improved air blow type rice mills were distributed and installed at farmers house under supervision of BRRI and local KOICA office. Seven of them installed at farmers house under supervision of BRRI and rest of 5 were installed at NGO site under direct supervision KOICA Bangladesh office. Locally available materials were used to fabricate the rice mills. A 24 hp diesel engine was used as prime mover to run the fabricated rice mill. No. 2 huller milling capacity is about 200-225 kg/h and suitable for house hold use only. The milling capacity of supplied mill was found 180–200 kg/h. It was revealed that the supplied rice mill will be commercially cost effective when the milling capacity is 243kg or above per hour in present situation.
2.4	Milling quality evaluation of BRRI dhan63 milled in different type of rice mill Duration: 01-07-2015 to 30-06-2016	BRRI dhan63 is one of the premium quality rice among so far BRRI released varieties. As BRRI dhan63 is a long grain variety, farmers have faced problem to process the paddy in existing steel engleburg rice mill as un-parboiled condition. Three existing, laboratory, improved air blow type and semi auto rice mill was used to observed the milling performance of BRRI dhan63. Six months aged paddy was processed as parboiled and un-parboiled condition at 13% moisture content. The sample size was 50 kg and three replications were taken for each

SI. No.	Research Progress	Expected output
		rice mill.The head rice of laboratory, air blow type and semi-auto rice mill was 92, 83.25 and 86.75% respectively as parboiled condition (based on total milled rice), whereas 90, 70.50 and 81.25% was for un-parboiled condition respectively. The degree of milling was found 10.15, 12.45 and 16.30% in laboratory rice mill, semi-auto rice mill and engleburg huller rice mill respectively. Therefore, BRRI dhan63 could not be milled as un-parboiled condition in existing steel engleburg huller mill effectively. It could be milled in semi and auto rice mill successfully as parboiled and un-parboiled condition. However, it needs to follow special drying, everyday four hours drying and followed by stacking for tempering and continues three to four days to remove moisture content up to 12%.
3	Project: Industrial and Farm Level Extension of Agricultural Machinery	
3.1	Farm level evaluation of mechanical rice transplanter in Rangpur and Jhenaidah district during cold season Duration: 01-07-2014 to 30-06-2015	The field capacity of rice transplanter obtained 0.11-0.12 ha/hr. Conventional seedbed preparation required 37-55 man-hr/ha whereas 71-77 man-hr/ha required in mat type seedling. Labor requirement in manual and mechanical transplanting ranged from 123-150 and 9.0-10.5 man-hr per hectare which was 19-22 and 1.65-2.00 percent of total labor requirement in rice cultivation, respectively. Mechanically transplanted plot showed significantly higher grain yield (9-14%) than hand transplanted method due to use of infant seedling and better planting efficiency.
3.2	Evaluation of BRRI prilled urea applicator at farmer's field Duration: 01-07-2014 to 30-06-2015	The field capacity of the BRRI prilled urea applicator (PUA) and BRRI USG applicator (USGA) obtained similar i.e. 0.09-0.10 ha/hr in both locations. PUA and USGA saved 29-32 percent urea fertilizer compared to hand broadcasting (HB). Urea application method gave insignificant effect on grain yield. BRRI

SI. No.	Research Progress	Expected output
		prilled urea applicator and BRRI USG applicator safely dispensed urea fertilizer in subsurface and save huge amount of urea fertilizer without sacrificing grain yield.
3.3	Comparative performance of BRRI mechanical and power weeder at farmers' field Duration: 01-07-2014 to 30-06-2015	The highest weed control efficiency obtained with BPW (78%) and the lowest (76%) in BMW. During weeding operation, BPW damaged lowest (9%) plants compared to BMW (11%). The effective field capacities were 0.06 and 0.09 ha/hr for BMW and BPW, respectively. The lowest labor requirement was 582 man-hr/ha for BPW and the highest was 650 man-hr/ha for HB. Weeding cost showed highest in HB (Tk 4287/ha) followed by BMW (Tk 1103/ha) and BPW (Tk 950/ha). HB showed the highest weeding cost (78%) compared to BPW. Weed control methods showed insignificant effect on grain yield.
3.4	Field trial and demonstration of promising farm machinery and technology to the LFS farmers under IAPP project Duration: 01-07-2012 to 30-06-2016	Field trial of farm machinery and technology was conducted in the LFS farmer's plot Barisal, Patuakhali, Nilphamari and Rangpur district during aman 2015, boro 2015-16 and aus 15 season. Rice seedling transplanted by mechanical transplanter in 17 cm space setting produced the highest grain than the close space setting (13 and 15 cm). Mechanically transplanted rice produce 16% higher grain yield than manually transplanted rice due to use of tender aged seedling. Prilled urea applicator safely dispensed urea in subsurface and produced highest grain yield hand broadcasted field. During this year, 98 farmers were trained on the operation and maintenance of farm machinery and technology.
3.5	Capacity building and field demonstration on farm machinery and technology under Mujibnagar project Duration: 01-07-2014 to 30-06-2017	The treatments were deep placement of USG by BRRI USG applicator, deep placement of prilled urea by BRRI prilled urea applicator and hand broadcasting of prilled urea. The grain yield of USG applied plot was slightly lower than the other two treatments. It was

SI. No.	Research Progress	Expected output
		proven that USG saved urea. BRRI USG applicator made easy placement of USG in the rice field which reduced the drudgery of the farmers. To train up the farmers about the farm machineries, 19 training programs were conducted during aman 2015, boro 2015-16 seasons and aus 2015 at different location within the project areas. Altogether 475 participants were attended in the training program.
3.6	Enhancement of crop productivity and reduction of production cost using farm machinery under PGBIADP project Duration: 01-07-2014 to 30-06-2017	Field demonstration of seedling raising technique, transplanting by mechanical rice transplanter, urea application by prilled urea applicator and weeding by BRRI weeder were conducted in 13 and 14 places of Gopalganj and Pirojpur districts during aman 2015 and boro 2015-16 season. Mechanically transplanted rice produced the highest yield than manually transplanted rice. The grain yield was the highest in prilled urea application by BRRI prilled urea applicator followed by hand broadcasting due to uniform placement of urea in subsurface. BRRI weeder reduced the weeding cost. Six (6) training programs on "seedling raising technique and operation & maintenance of farm machinery" were conducted during aman 2015 and boro 2015-16 seasons Altogether 347 participants were attended in the training programs.

Workshop Machinery and Maintenance

Research Progress 2015-16

Sl. No.	Research Progress	Expected output
1	Design and development of power transmission system of a self-propelled power unit for multiple use Progress:	A self-propelled power unit for multiple use will be developed.

	Design of power transmission system of a self-propelled power unit has been done with the help of AutoCAD. Its fabrication is going on at BRRI research workshop.	
2	Design, development, and modification of self-propelled reaper Progress: The complete design of self-propelled reaper has been done with the help of AutoCAD. Fabrication of the reaper is going on at BRRI Research Workshop. Test and evaluation of self-propelled reaper will be done at field level.	Self-propelled reaper will be developed and tested. Harvesting time, cost, human drudgery and yield loss will be minimized.
3	Modification of reaper travelling wheel for wet-land condition Progress: Complete design and drawing of self-propelled reaper wheel have been done with the help of AutoCAD and its fabrication has been completed at BRRI research workshop. It has been tested in wet paddy field at BRRI farm, Gazipur and it performed well in semi-wet land condition due to the increased contact area between the reaper travelling wheel and soil. Now, there is a problem in tail-wheel to operate it in wet land. So, it is necessary to design a tail-wheel to overcome this problem.	Semi-wet land suited travelling wheel has been developed and tail wheel of this reaper will be developed.
4	Determination of tilling efficiency of power tiller at selected areas of Bangladesh Progress: Experiments are being conducted in Boro and Aman seasons to determine paddy yield as influenced by different tillage depths (4-5 inch, 5-6 inch, 6-7 inch and 7-8 inch). It will also be tested in different places.	Optimum tillage depth for maximum paddy yield will be determined in different areas.
5.	Study on adoption level of agricultural machinery in farmers' field Progress: Data were collected from Harinakundu, Shailakupa and Jhenidah Upazilla. It will be continued.	Disseminate the benefit of proper farm machinery over traditional method based on the investigation results.

Adaptive Research Division

Research Progress: 2015-2016

A. Technology Validation
1. Expt. Title: Advanced Lines Adaptive Research Trial (ALART)
Objectives:

- To evaluate the yield potential and adaptability of advanced breeding lines at farmers' field in different agro-ecological conditions.
- To get feedback information about the advantages and disadvantages of the advanced lines from farmers and DAE personnel.

The Adaptive Research Division (ARD) evaluated the following 14 sets of ALARTs in different agro-ecological regions of Bangladesh in different seasons during 2015-2016.

Sl. No.	Research Progress Expt. Title and locations	Expected output
1.1	ALART, T. Aus 2015: BRRI research farm (Gazipur), Nouga (Manda), Rangpur (Pirgonj), Barisal (Bakergonj), Chittagong (Mirsori), Kushtia (Sadar), Moulovibazar (Srimongol), Satkhira (Kolaroa), Bagerhat (Kochua), Khagrachari (Sadar) and Sherpur (Nokhla)	Two advanced lines along with BR26 and BRRI dhan48 as checks were tested in 11 locations. Considering grain yield (4.35 t/ha), growth duration (111 days), disease infections, farmers' opinion and other necessary aspects, NERICA Mutant was considered for Proposed Variety Trial (PVT).
1.2	ALART (Micronutrient enriched rice), T. Aman 2015: BRRI research farm (Gazipur), Rajshahi (Godagari), Barisal (Sadar), Chittagong (Hathazari), Satkhira (Sadar), Rangpur (Sadar), Thakurgaon (Sadar), Dinajpur (Sadar), Mymensingh (Sadar), Habigonj (Sadar), Khulna (Dumuria) and Feni (Sadar)	Three micronutrient enriched advanced lines along with BR25, BRRI dhan32 and BRRI dhan39 as checks were tested in 12 locations. Based on grain yield, grain size, grain quality, growth duration, disease reaction, phenotypic acceptance and farmers' opinion, none of the advance lines was recommended for PVT.
1.3	ALART (Rainfed lowland rice), T. Aman 2015: BRRI research farm (Gazipur), Rajshahi (Godagari), Barisal (Sadar), Chittagong (Hathazari), Satkhira (Sadar), Rangpur (Sadar), Thakurgaon (Sadar), Dinajpur (Sadar), Mymensingh (Sadar), Habigonj (Sadar), Khulna (Dumuria) and Feni (Sadar)	Four advanced lines suitable for rainfed lowland along with BRRI dhan39, BRRI dhan57 and BRRI dhan62 as checks were tested in 12 locations. Considering grain yield (4.80 t/ha), grain size, growth duration (119 days), disease reaction, phenotypic acceptance and farmers' opinion, WAS 161-B-4-B-1-TGR 51 (NERICA-L-32) was found suitable for PVT.
1.4	ALART (BB Resistant),	One advanced line resistant to bacterial blight

	T. Aman 2015: BRRI research farm (Gazipur), Rajshahi (Godagari), Barisal (Sadar), Chittagong (Hathazari), Satkhira (Sadar), Rangpur (Sadar), Thakurgaon (Sadar), Dinajpur (Sadar), Mymensingh (Sadar), Habigonj (Sadar), Khulna (Dumuria) and Feni (Sadar)	along with BR11 and BRRI dhan31 as checks were tested in 12 locations. Considering grain yield (4.84 t/ha), growth duration (126 days), grain size, resistant to BB and farmers' opinion, BRC245-4-19-2-1 was recommended for PVT.
1.5	ALART (Flash flood submergence), T. Aman 2015: BRRI research farm (Gazipur), Jamalpur (Sadar and Dewangonj), Rangpur (Gongachara), Nilphamari (Sadar), Sylhet (Golapgonj), Kurigram (Chilmari), Habiongj (Sadar), Gaibandha (Palashbari) and Lalmonirhat (Sadar)	Two advanced lines tolerant to submerged condition along with BRRI dhan49 and BRRI dhan52 as checks were tested in 10 locations. Considering higher grain yield (3.50-3.38 t/ha) and shorter growth duration (142 days) compared to check varieties, submergence tolerant level, grain size, the tested advance lines, BR9159-8-5-40-13-52 and BR9159-8-5-40-14-57 were recommended for PVT.
1.6	ALART (Hybrid), T. Aman 2015: BRRI research farm (Gazipur), Rajshahi (Godagari), Barisal (Sadar), Chittagong (Hathazari), Satkhira (Sadar), Rangpur (Sadar), Thakurgaon (Sadar), Dinajpur (Sadar), Mymensingh (Sadar), Habigonj (Sadar), Khulna (Dumuria) and Feni (Sadar)	Two advanced lines for hybrid rice along with BRRI hybrid dhan4, BRRI dhan39 and BRRI dhan49 as checks were tested in 12 locations. Considering grain yield compared to check varieties, growth duration, grain size, disease infection and farmers' opinion, none of the tested advance lines was recommended for PVT.
1.7	ALART, Favorable Boro-Short duration, Boro 2016: BRRI research farm (Gazipur), Rajshahi (Godagari), Rangpur (Sadar), Barisal (Sadar), Chittagong (Hathazari), Shunamgonj (Sadar), Habigonj (Sadar), Khulna (Dumuria), Satkhira (Sadar), Jessore (Jhikorgacha), Thakurgaon (Sadar) and Dinajpur (Sadar)	Two advanced lines for shorter duration along with BRRI dhan28 as check were evaluated in 12 locations. Considering grain yield (5.76-6.10 t/ha), growth duration (142-143 days), grain size similar to BRRI dhan28, disease infection and farmers' opinion, both the tested advanced lines BRRI dhan29-SC3-28-16-10-8-HR1 (Com) and BR7358-5-3-2-1-HR2 (Com) were recommended for PVT.
1.8	ALART, High yielding-Short duration, Boro 2016: BRRI research farm (Gazipur), Rajshahi (Godagari), Rangpur (Sadar), Barisal (Sadar), Comilla (Burichang), Shunamgonj (Sadar), Habigonj (Sadar),	Three advanced lines for high yielding and shorter duration along with BRRI dhan28 as check were evaluated in 12 locations. Considering the different aspects of the advanced lines, the experiment should be repeated by selecting the proper check variety (BRRI dhan58).

	Khulna (Dumuria), Satkhira (Sadar), Jessore (Jhikorgacha), Sherpur (Nokla) and Gopalgonj (Sadar)	
1.9	ALART, Micronutrient Enriched-Short duration, Boro 2016: BRRI research farm (Gazipur), Rajshahi (Godagari), Rangpur (Sadar), Barisal (Sadar), Chittagong (Hathazari), Shunamgonj (Sadar), Habigonj (Sadar), Khulna (Dumuria), Satkhira (Sadar), Jessore (Jhikorgacha), Thakurgaon (Sadar) and Dinajpur (Sadar)	Two micronutrient enriched short duration advanced lines along with BRRI dhan28 as check were evaluated in 12 locations. Considering grain yield, growth duration, grain size, disease infection and farmers' opinion, none of the tested advance lines were found more suitable than the check variety BRRI dhan28. So, none of the lines was recommended for PVT.
1.10	ALART, Green Super Rice-Long Duration, Boro 2016: BRRI research farm (Gazipur), Rajshahi (Godagari), Rangpur (Sadar), Barisal (Sadar), Comilla (Burichang), Shunamgonj (Sadar), Habigonj (Sadar), Khulna (Dumuria), Satkhira (Sadar), Jessore (Jhikorgacha), Sherpur (Nokla) and Gopalgonj (Sadar)	Three long duration advanced lines characterized by green super rice along with BRRI dhan58 and BRRI dhan29 as checks were evaluated in 12 locations. Considering grain yield (6.45 t/ha), growth duration (153 days), grain size, disease reaction and farmers' opinion, HHZ15-DT4-DT1-Y1was recommended for PVT.
1.11	ALART, Biotechnology-Short duration, Boro 2016: BRRI research farm (Gazipur), Rajshahi (Godagari), Rangpur (Sadar), Barisal (Sadar), Chittagong (Hathazari), Shunamgonj (Sadar), Habigonj (Sadar), Khulna (Dumuria), Satkhira (Sadar), Jessore (Jhikorgacha), Thakurgaon (Sadar) and Dinajpur (Sadar)	Two advanced breeding lines developed by biotechnology division along with BRRI dhan28 as check were evaluated in 12 locations. Considering grain yield (5.43-5.62 t/ha), growth duration (141-142 days), grain size, disease infection very similar to those of check variety BRRI dhan28 and farmers' opinion, both the tested advance lines BR(BIO)8072-AC5-4-2-1-2-1 and BR(BIO)8072-AC8-1-1-3-1-1 were recommended for PVT.
1.12	ALART, Biotechnology-Long duration, Boro 2016: BRRI research farm (Gazipur), Rajshahi (Godagari), Rangpur (Sadar), Barisal (Sadar), Comilla (Burichang), Shunamgonj (Sadar), Habigonj (Sadar), Khulna (Dumuria), Satkhira (Sadar), Jessore (Jhikorgacha),	One long duration advance line along with BRRI dhan58 and BRRI dhan29 as checks were evaluated in 12 locations. Considering grain yield, growth duration, grain size, disease reaction, phenotypic acceptance and farmers' opinion, BR(BE) 6158-RWBC2-1-2-1-1 was not recommended for PVT.

	Sherpur (Nokla) and Gopalgonj (Sadar)	
1.13	ALART, Hybrid, Boro 2016: BRRI Research Farm (Gazipur), Godagari (Rajshahi), Sadar (Rangpur), Sadar (Barisal), Burichang (Comilla), Sadar (Shunamganj), Sadar (Habiganj), Dumuria (Khulna), Sadar (Shatkhira), Zikorgacha (Jessore), Nokhla (Sherpur) and Sadar (Gopalganj)	Two advanced breeding lines of hybrid rice along with check variety BRRI hybrid dhan3 and BRRI dhan28 were tested in 12 locations. Based on grain yield, growth duration, grain size and farmers' opinion, none was found suitable for PVT.
1.14	ALART, Short duration-Comilla, Boro 2016: Sadar (Feni), Dagonbuiyan (Feni), Chandina (Comilla), Burichang (Comilla), Haziganj (Chandpur), Kachua (Chandpur) and Sadar (Brahmonbaria)	Three advanced breeding lines suitable for Comilla region along with check varieties BRRI dhan28 and BRRI dhan60 were tested in seven locations. Based on grain yield (6.04 t/ha), growth duration (140 days), grain size, phenotypic acceptance and farmers' opinion, the advance line HHZ23-DT16-DT1-DT1 was recommended for PVT.

B. Technology Dissemination

2. Expt. Title: Seed Production and Dissemination Program (SPDP) of BRRI varieties with other technologies under GOB and other projects such as IAPP, MIADP and EQSS.

Objectives:

- To encourage the farmers for production, processing and storing of quality seeds at on-farm level.
- To enhance adoption and dissemination of BRRI varieties through exchanging seeds among the farmers.
- To get feedback information from the farmers and DAE personnel about BRRI varieties and other technologies such as USG.

Sl. No.	Research Progress		Expected Output			
	Expt. Title (Dissemination Program)	Locations	Total production through demonst. (kg)	Seeds retained by farmers (kg)	Farmers gained awareness through demonst. (no.)	Motivated Farmers (no.)
2.1 SPDP under BRRI core program (GOB)						
2.1.1	SPDP during T. Aus, 2015 using BRRI dhan48 and BRRI dhan55	5 upazilas of 4 districts (Sherpur, Gazipur, Netrokona &	16,220	2,230	2,375	477

		Rajbari)				
2.1.2	SPDP in Jhum cultivation during Aus, 2015 using BR24, BRRI dhan27 & BRRI dhan55	3 upazilas of 3 hilly districts (Bandarban, Rangamati & Khagrachari)	2,750	685	335	189
2.1.3	SPDP during T. Aus, 2015 in valley using BRRI dhan48	3 upazilas of 3 hilly districts (Bandarban, Rangamati & Khagrachari)	683	60	190	82
2.1.4	SPDP during B. Aus, 2015 using BR24 & BRRI dhan43	6 upazilas of 3 districts (Magura, Narail & Rajbari)	4814	675	815	350
2.1.5	SPDP with USG during T. Aman 2015 using BR22, BR23, BRRI dhan37, 38, 41, 49, 52, 56, 57, 62 and 67	16 upazilas of 10 districts (Satkhira, Chittagong, Cox's Bazar, Habigonj, Gaibandha, Khulna, Rajbari, Netrokona, Sherpur & Dinajpur)	24592	4965	4095	1510
2.1.6	SPDP with USG during Boro, 2016 using BRRI dhan58, 59, 60, 63 & 67	35 uazilas of 18 districts Gopalganj, Rajbari, Netrakona, Sherpur, Khulna, Jessore, Bagerhat, Dinajpur, Thakurgaon, Panchagor, Gaibandah, Naogaon, Bogra, Chittagong, Cox's Bazar, Moulobi Bazar,	95540	13350	10788	5856

		Sylhet & Sunamganj				
2.2 SPDP under Integrated Agricultural Productivity Project (IAPP)						
2.2.1	SPDP during T. Aus 2015 using BRRI dhan48 and 55.	4 upazilas of 4 districts of (Barisal, Patuakhali, Rangpur & Lalmonirhat)	5574	220	305	49
2.2.2	SPDP with USG during T. Aman 2015 using BRRI dhan41, 44, 54, 56, 57 & 62	10 upazilas of 8 districts of (Barisal, Patuakhali, Jhalokathi, Barguna, Rangpur, Nilphamari, Lalmolnirhat and Kurigram)	17466	1902	3022	666
2.2.3	SPDP with USG during Boro 2016 using BRRI dhan47, 58, 60, 61, 63 & 67	8 upazilas of 5 districts (Barisal, Patuakhali, Jhalokathi Rangpur, Lalmolnirhat)	18748	1370	2137	355
2.3 SPDP under Mujibnagar Integrated Agricultural Development Project (MIADP)						
2.3.1	SPDP during T. Aus 2015 using BRRI dhan48 and 55.	12 upazilas of 4 districts (Kushtia, Meherpur, Chuadanga & Jhinaidah)	15338	1210	1111	359
2.3.2	SPDP with USG during T. Aman 2015 using BRRI dhan49, 57 & 62	12 upazilas of 4 districts (Kushtia, Meherpur, Chuadanga & Jhinaidah)	22224	2350	3328	837
2.3.3	SPDP with USG during Boro, 2016 using BRRI dhan58, 60 & 63	12 upazilas of 4 districts (Kushtia, Meherpur, Chuadanga & Jhinaidah)	31732	2944	3407	1392
2.4 Enhancing Quality Seed Supply (EQSS) Project						

2.5.1	QSPDP during T. Aman 2015 using BRRI dhan49, 52 & 57	10 upazilas of 5 districts (Norsingdi Tangail Kishoergonj, Gazipur and Mymensingh)	16781	3407	3128	1543
2.5.2	QSPDP during Boro, 2016 using BRRI dhan58 & 69	10 upazilas of 5 districts (Norsingdi Tangail Kishoergonj, Gazipur and Mymensingh)	16770	2794	2161	1089
Grand Total			289.23 t	38.16 t	37,197	14,754

3. Adaptive trial of modern rice varieties under IAPP				
Sl. No.	Research Progress	Expected Output		
	Expt. Title	Grain yield (t ha^{-1})	Growth duration (days)	Suitable variety
3.1	Adaptive trials, T. Aus 2015 in Barisal region: Two Adaptive trials were conducted in Barisal and Patuakhali districts following RCB design with three replications. The used varieties were as follows:			
	BRRI dhan27	4.42	117	BRRI dhan27
	BRRI dhan48	4.37	111	
	BRRI dhan55	3.53	108	
	BRRI dhan65	3.35	103	
	Munsur Irri (Ck)	4.26	122	
3.2	Adaptive trials, T. Aus 2015 in Rangpur region: Two Adaptive trials were conducted in Rangpur and Lalmonirhat districts following RCB design with three replications. The used varieties were as follows:			
	BRRI dhan43	3.73	102	BRRI dhan48
	BRRI dhan48	4.51	109	
	BRRI dhan55	4.15	106	
	BRRI dhan65	3.70	103	
	BRRI dhan28 (Ck)	3.92	108	

3.3	Adaptive trials, T. Aman 2015 in Barisal region: Four Adaptive trials were conducted in 4 upazilas of 4 districts (Barisal, Jhalokathi, Patuakhali and Borguna). RCB design with three replications were followed in the trial using the varieties below:			
	BRRI dhan41	4.50	149	BRRI dhan41 and BRRI dhan52
	BRRI dhan44	4.35	146	
	BRRI dhan52	4.77	143	
	BRRI dhan54	4.07	136	
	Local Ck (BR11, Dudkalam & Sadamota)	3.24-3.69	141-161	
3.4	Adaptive trials, T. Aman, 2015 in Rangpur region: Four Adaptive trials were conducted in Rangpur, Kurigram, Lalmonirhat and Nilphamari districts following RCB design with three replications. The used varieties were as follows:			
	BRRI dhan49	4.72	137	BRRI dhan49
	BRRI dhan56	4.11	109	
	BRRI dhan57	3.64	106	
	BRRI dhan62	3.88	103	
	Local check (Binadhan-7, Swarna & Guti Swarna)	3.93	-	
3.5	Adaptive trials, Boro, 2016 in Barisal region: Three Adaptive trials were conducted in Barisal, Jhalokathi and Patuakhali districts following RCB design with three replications. The used varieties were as follows:			
	BRRI dhan47	5.60	150	BRRI dhan67 and BRRI dhan69
	BRRI dhan61	4.42	147	
	BRRI dhan64	4.71	149	
	BRRI dhan67	6.15	141	
	BRRI dhan69	6.24	151	
	Local check (Kajla, Bhajan, Binadhan-10)	5.68	154	
3.5	Adaptive trials, Boro, 2016 in Rangpur region: Two Adaptive trials were conducted in Rangpur and Lalmonirhat districts following RCB design with three replications. The used varieties were as follows:			BRRI dhan58 and BRRI dhan63
	BRRI dhan50	5.82	152	
	BRRI dhan58	6.91	153	
	BRRI dhan59	5.85	151	
	BRRI dhan60	6.30	148	
	BRRI dhan63	6.02	145	
	BRRI dhan28 (Check)	5.43	141	

4. Promotional activities:

Sl. No.	Activities	Expected Output
4.1 Farmers training		
	Farmers' training on modern rice production technologies during 2015-16: 38 farmers' trainings were arranged under different projects (MIADP, EQSS and BRRI core program).	About 1,330 farmers and DAE field staffs were trained about modern rice production technologies.
4.2	Field day: About 66 Field days were conducted during 2015-2016 in different seasons under different projects (IAPP, MIADP, EQSS) and GOB.	About 11550 farmers and DAE personnel and local elite people participated and gained knowledge about BRRI technologies.

Training Division

Research Progress 2015-2016

Sl. No.	Research Progress	Expected Output
	1. Capacity Building and Technology Transfer Through Training	Knowledge and skill of the trained personnel on the subject matters will be increased.
	1.1 Two month rice production training Participant : BRRI Scientists Duration: 2 Months Batch: 2 No. of participants: 44 Progress: Completed	Knowledge of new BRRI scientists on rice production, research planning, and execution, data analysis and report writing will be increased.
	1.2 Training on Crop Management Skill (GSR)-special Participant: BRRI Scientists, BRAC and BADC Officers Duration: 2 days Batch: 1 No. of participant: 32 Progress: Completed	Knowledge of the trainees about Green Super Rice and their management will be enriched.

	1.3 Integrated Rice Production Training (PGB) Participant: SAAO (DAE) Duration: 1 week Batch: 5 No. of participants: 146 Progress: Completed	Trained personnel will be able to identify field problems of rice cultivation and solve the problem. Rice production in the project area will be increased.
	1.4 Training on Modern Rice and Quality seed Production (EQSSP) Participant : DAE Officers Duration: 1 week Batch: 14 No. of participants: 278 Progress: Completed	Knowledge and skill of the participants on modern rice and quality seed production will be enriched. Supply and use of quality rice seed will be increased. Total rice production of the country will be increased.
	1.5 Training on Quality Rice Seed Production and Storage (EQSSP and PGB) Participants: DAE Officers Duration: 3 days Batch: 9 (EQSSP-8 and PGB-1) No. of participants: 171 Progress: Completed	Knowledge and skill of the participants on quality rice seed production will be enriched. Supply and use of quality rice seed will be increased. Total rice production of the country will be increased.
	1.6 Modern Rice Production Training Participant: BRRI Officers Duration: 1 week Batch: 1 No. of participant: 27 Progress: Completed	Knowledge and skill of the participants on modern rice production will be enriched.
	1.7 Modern Rice Production Training Participant: Scientific Assistants (SA) of BRRI Duration: 1 week Batch: 1 No. of participant: 13 Progress: Completed	Knowledge and skill of the participants on modern rice production and data collection from the experimental field will be enriched.
	1.8 Modern Rice Production Training	Rice

	Participant: Farmers Duration: 1 Day Batch: 29 (Regular 16 batch, EQSSP 13 batch) No. of participant: 870 Progress: Completed	yield at field level will be increased.
II	**Evaluation of imparted training program**	
	Training programe: 2 months and 1-week training programe. Progress: Completed	This will help improvement of training course and method of training.
III	**BRKB and its improvement.**	
	Progress: Updated with new fact sheets of BRRI dhan70, BRRI dhan71, BRRI dhan72, BRRI Dhan73 and BRRI dhan74	Updated information on rice production technologies will be available.

BRRI Regional Station Comilla

Research Progress 2015-2016

Sl. No.	Research Progress	Expected Output
Programme Area: Varietal Development Program		
1 2 3	**Project: Breeding rice varieties for Comilla Region for T. Aus** Expt. 1 : Regional yield trial (RYT) No genotypes were selected from RYT#1 No genotypes were selected from RYT#2 Expt. 2 : Advanced yield trial (AYT) 2 genotypes were selected Expt. 3 : Proposed Variety Trial (PVT) 1 genotype was evaluated from PVT	Improved genotypes with high yield potential along with earliness, resistance to lodging, major diseases and insect pests will be developed for Comilla region
4	**Project: Breeding rice varieties for Comilla Region for T. Aman** Expt. 1 : Hybridization 26 crosses were made using 22 parents Expt. 2 : F1 Confirmation	Improved genotypes with high yield potential along with earliness, premium quality photoperiod sensitivity and

5 6 7 8 9 10 11 12	37 crosses were confirmed among 37 crosses. Expt. 3 : F2 Confirmation 212 progenies were selected among 12 crosses Expt. 4 : Pedigree nursery F3 – 287 progenies were selected among 528 progenies F4 - 177 progenies were selected among 480 progenies F5 – 262 progenies were selected and 06 homozygous breeding lines progenies were bulked among 486 progenies F6 - 10 progenies were selected and 44 homozygous breeding lines progenies were bulked among 156 progenies Expt. 5: Observational trial (OT). 8 genotypes were selected among 8 genotypes. Expt. 6 : Preliminary Yield Trial (PYT). 3 genotypes were selected from PYT#1Com (RLR) 5 genotypes were selected from PYT#2 (RLR) Expt. 7 : Secondary Yield Trial (SYT) 2 genotypes were selected from SYT#1 Com 1 genotypes was selected from SYT#2 Com 3 genotypes were selected from SYT#3 Com <u>Experiments from HQ(Plant Breeding Division)</u> Expt. 8 : Regional yield trial (RYT) 1 genotypes was selected from RYT#1 (RLR) 3 genotypes were selected from RYT#2 (RLR) 3 genotypes were selected from RYT#3 (PQR) 2 genotypes were selected from RYT#4 (MN-LS) No genotypes were selected from RYT#5 (MN-SB) No genotypes were selected from RYT#5 (MN-KB) 4 genotypes were selected from RYT#6 (Disease Res.) 2 genotypes were selected from RYT#1 (Biotech) Expt. 9 : Advanced yield trial (AYT) 1 genotypes was selected from AYT#1 (RLR) 1 genotypes was selected from AYT#2 (RLR) 4 genotypes was selected from AYT#3 (PQR) 1 genotypes was selected from AYT#4 (MER) No genotypes were selected from AYT#5 (GSR)	resistance to lodging, major diseases and insect pests will be developed for Comilla region

13	Expt. 10: Evaluation of Advanced Tidal Lines (ATL) for yield and other agronomic characters 2 genotypes were selected from ATL	
14	Expt. 11: Evaluation of stagnant tolerant Lines (TL) for yield and other agronomic characters 14 genotypes were selected from 54 genotypes	
15	Expt. 12: Head Row materials for Pure lines 3 Head rows are done	
16	Expt. 13: Evaluation of IRLON(International Rainfed Lowland Rice Observational Nursery) materials 20 genotypes were selected from 37 genotypes	
17	Expt. 14: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) INDICA 2014 materials (First generation Module 1) 34 genotypes were selected from 64 genotypes	
18	Expt. 15: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) INDICA 2014 materials (First generation Module 2) 10 genotypes were selected from 19 genotypes	
19	Expt. 16: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) PLUS 2014 materials (First generation Module 1) 15 genotypes were selected from 49 genotypes	
20	Expt. 17: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) PLUS 2014 materials (First generation Module 2) 20 genotypes were selected from 33 genotypes	
21	Expt. 18: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) GLOBAL 2015 materials (Second generation Module 1) 14 genotypes were selected from 38 genotypes Expt. 19: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) GLOBAL 2015 materials (Second generation Module 2)	

22 23 24 25	13 genotypes were selected from 26 genotypes Expt. 20: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) INDICA 2015 materials (Second generation Module 1) 20 genotypes were selected from 45 genotypes Expt. 21: Evaluation of MAGIC (Multi-Parent Advanced Generation Intercross) INDICA 2015 materials (Second generation Module 2) 11 genotypes were selected from 24 genotypes Expt. 22 : Proposed Variety Trial (PVT) 1 genotypes was evaluated from PVT#SD RLR 1 genotypes was evaluated from PVT#RLR 1 genotypes was evaluated from PVT#PQR 1 genotypes was evaluated from PVT#GSR	
26 27 28 29 30 31	**Project: Breeding rice varieties for Comilla Region for Boro** Expt. 1 : Hybridization 40 crosses were made using 40 parents. Expt. 2 : F1 Confirmation 33 crosses were confirmed among 33 crosses. Expt. 3 : F2 Confirmation 618 progenies were selected among 27crosses. Expt. 4 : Pedigree nursery F3 – 199 progenies were selected from 425 progenies F4 – 136 progenies were selected from 173 progenies F4 – 136 progenies were selected from 173 progenies F5 – 613 progenies were selected from 719 progenies F6 – 98 progenies were selected and 6 homozygous breeding lines progenies were bulked from 106 progenies F7 – 38 homozygous breeding lines progenies were bulked from 89 progenies Expt. 5: Observational trial (OT) TRB 124 genotypes were selected among 166 genotypes. Expt. 6: Preliminary yield trial (PYT)	Improved genotypes with high yield potential along with earliness, aroma and resistance to drought, major diseases and insect pests will be developed for Comilla region

	10 genotypes were selected from PYT (Com)# IRLON 2 genotypes were selected from PYT#1 (Com) 2 genotypes were selected from PYT#2 (Com) 2 genotypes were selected from PYT#3 (Com) 4 genotypes were selected from PYT#1 (GSR) 5 genotypes were selected from PYT#2 (GSR)	
32	Expt. 7 : Secondary Yield Trial (SYT) 5 genotypes were selected from SYT# Com	
33	Experiments from HQ(Plant Breeding Division) Expt. 7 : Regional yield trial (RYT) 3 genotypes were selected from RYT#1FB No genotypes were selected from RYT#2 FB 3 genotypes were selected from RYT#3 PQR 1 genotypes was selected from RYT#4 High yield 2 genotypes were selected from RYT#5 Cold 2 genotypes were selected from RYT#6 insect Res. No genotypes were selected from RYT#1 MER No genotypes were selected from RYT#2 MER No genotypes were selected from RYT#3 MER LA No genotypes were selected from RYT#1 MER 2 genotypes were selected from RYT#1 Biotech 2 genotypes were selected from RYT#2 Biotech	
34	Expt. 9 : Advanced yield trial (AYT) 4 genotypes were selected from AYT# (Com) 3 genotypes were selected from AYT# (GSR)	
35	Expt. 8 : Advanced line adaptive research trial (ALART) 2 genotypes were selected from ALART#GSR 1 genotype was selected from ALART #Com	
36	Expt. 11: Evaluation of Spike Gene Lines (SGL) for yield and other agronomic characters	
37	2 genotypes were evaluated from SGL	
38	Expt. 13: Evaluation of IIRON(International Irrigated Rice Observational Nursery) materials 16 genotypes were selected from 30 genotypes Expt. 14: Evaluation of MST (Multi- stress tolerant) GSR materials	

39	30 genotypes were evaluated Expt. 15: Evaluation of Super Yielder GSR materials 17 genotypes were evaluated	
40	Expt. 1: Breeder seed production In T. Aman, 2250kg BR22, 740 kg BRRI dhan32, 350 kg BRRI dhan48, 4174 kg BRRI dhan49 and 1772 kg BRRI dhan62. In Boro, 6750 kg BRRI dhan28, 5325 kg BRRI dhan29 5325 kg BRRI dhan58 , 3825 kg BRRI dhan64 and 3300 kg BRRI dhan69 breeder seeds were produced and were sent to GRS division, BRRI Gazipur	increase of breeder seeds of T.Aman and Boro season with target amount
	Programme Area 02: Socio-Economics and Policy	
41	Expt.1: Stability Analysis of BRRI Varieties In Aman, among 30 varieties, BRRI dhan32 (6.09 t/ha) gave highest yield followed by BR22 (5.72t/ha), BR23 (5.65t/ha), BRRI dhan31 (5.5 t/ha) and BRRI dhan53 (5.53 t/ha) but they were statistically similar. In Boro, among 32 varieties considering yield performance, the top five varieties were BRRI dhan59, BR3, BRRI dhan58, BRRI dhan45, and BRRI dhan67.	Evaluation of BRRI developed T. aman and Boro varieties to determine the stability index
	Programme Area 03: Crop-Soil-Water Management	
42	Expt.2: Evaluation of BRRI varieties as braus/ Aus,15 (observational trial) All the varieties gave similar yield statistically though BRRI dhan48 and BRRI dhan58 gave 4.72 and 4.52 t/ha having growth duration 107 and 108 days respectively.	Suitable variety for Aus from the existing varieties.
43	Expt.3: Study on herbicide tolerance of BRRI released Aman varieties (new) No phytotoxic effect of herbicide was found due to rainfall.Weed free condition gave highest yield followed	Phytotoxic effect of particular herbicide on particular variety.

	by pre Emergence and post emergence herbicide but they were statistically similar. Among the variety , BRRI dhan49 gave highest yield followed by BRRI dhan39 and statistically different.	
44	Expt.4: Effect of spacing and seedling number on growth and yield of BRRI dhan69 in Aman There is no effect of spacing and seedling number on the yield of BRRI dhan69 though it has less tillering capacity	More yield by adjusting seedling number and spacing.
45	Expt. 5: Nutrient management of BRRI dhan32 in T Aman Increased potassium had no impact on lodging resistance of BRRI dhan32 rather it is related to nitrogen. Lesser the nitrogen, lesser the lodging.	Increased lodging resistance in BRRI dhan32.

46	Expt. 6: Study on herbicide tolerance of BRRI released Boro varieties (new) Damaged due to germination failure.	
47	Expt. 7: Effect of spacing and seedling number on growth and yield of BRRI dhan69 in Boro There is no effect of spacing and seedling number on the yield of BRRI dhan69 though it has less tillering capacity	More yield by adjusting seedling number and spacing.
48	Expt. 8: Nutrient management of BRRI dhan32 in Boro Increased potassium had no impact on lodging resistance of BRRI dhan32 rather it is related to nitrogen. Lesser the nitrogen, lesser the lodging.	Increased lodging resistance in BRRI dhan32.
49	Expt. 9: Effect of planting time on growth and yield of BRRI dhan62 in Boro. (on going)	Optimum planting time for BRRI dhan62 in Boro season.

	16.12.15 seeding gave highest yield in both BRRI dhan28(6.7 t/ha and BRRI dhan62(7.7 t/ha)	
50	Expt. 10: Effect of Foliar Application of Silicon on Yield and Quality of Rice in Different Seasons T Aman 2015 & Boro 2015-16 of Bangladesh Silicon showed no significant effect on plant height, harvest index, number of kernels and opaque kernels percentage. Silicon (1.00% silicon solution) produced maximum grain diameter and silicon (0.50% silicon solution) produced maximum grain protein while silicon @ 0.25% silicon solution resulted maximum in number of productive tillers, straw yield, branches per panicle, grains per panicle, 1000 grain weight, paddy yield and grain starch. All others parameters have overlapping results of different silicon levels.	Depending upon the source and dose of Si fertilizer will be applied to soils, the severity and incidence of diseases can be reduced and the growth and yield of rice will be increased
51	Expt. 11: Updating fertilizer doses through SSNM (Side Specific Nutrient Management) for BRRI released varieties Omission of N, P , K, Zn & S had effect on grain yield of the tested varities indicating that a maintenance dose of fertilizer is enough for these entries. Among the varieties BRRI dhan69 produced the highest grain (8.49 t/ha), which was significantly higher than BRRI dhan58 (7.51 t/ha).	BRRI dhan58 & BRRI dhan69 produced maximum yield in less than 20% urea fertilizer.
	Programme Area 04: Pest Management	
52	Expt. 1: Effect of planting time on the incidence of	Control measures of false smut

	false smut disease in BRRI dhan49 The incidence of false smut disease (% panicle infection) was higher in 3rd planting time (15 July) than planting 1st and 2nd time (15 June and 30 June. The incidence of false smut disease was increased in late planting i.e after month of June	disease of rice
53	Expt. 2: Effect of fungicides on the incidence of false smut disease in BRRI dhan 49 The highest level of percent panicle infection was observed in T4 (Control) treatment of third planting. In general, among the all treatments, T3(Azoxystrobin + Propiconazole) showed better result in percent panicle infection and number of smut ball at all planting time	Control measures of false smut disease of rice
54	Expt.3: Reaction and recoverability of T Aman varieties to tungro disease The incidence and severity of rice tungro disease were higher in three T Aman varieties under T3 treatment compared to T1 (insecticide spray) and T2 (covered by net)treatments. It was observed that incidence and severity of all three BRRI varieties under T1 and T2 treatments showed almost same result. But three BRRI varieties under T2 treatment showed better yield compared to T3 (open) treatment	Recover and tolerance ability to tungro disease
55	Expt. 4: Evaluation of advanced breeding lines against Tungro disease	Resistant line to tungro disease in Bangladesh condition

	Three highly resistant and three moderately resistant lines were found	
	Programme Area 05: Rice Farming System	
56	Expt.1: Evaluation of RCM & BRRI Practice in farmers' field Rice crop manager (RCM) performed better than BRRI practice and farmer practice in respect with yield (t/ha) and cost-reurn (taka).	Field and variety specific software based total management package for rice
	Programme Area 06: Technology Transfer	
57	Expt.1: Demonstration and dissemination of variety In T. aus, average yield and growth duration of BRRI dhan48 over the **fifteen** locations of Comilla region were 4.44 t/ha and 109 days respectively. In Aman, variety BR22, BRRI dhan46, BRRI dhan49 and BRRI dhan62 were disseminated over the **fifteen** locations of Comilla region. **Three hundred twenty five** demonstration of BRRI dhan62 (Zinc enriched) were done in different upazilas of Comilla region in T Aman season.. In Boro, variety BRRI dhan58, BRRI dhan64, BRRI dhan63 and BRRI dhan69 were disseminated over the **ten** locations of Comilla region. **Twenty five** demonstrations of BRRI dhan64 (Zinc enriched) were done in 5 upazilas of Comilla region.	Demonstration and dissemination of new variety

58	Expt 2:Training /Agricultural Fair Day long thirty training programs on rice production technologies were conducted by BRRI comilla during the reporting year. Nine hundred farmers (710 male and 190 female) were trained on these three training program. Besides, fiften field days were conducted during the reporting year. BRRI Comilla also participated in three agricultural fairs.	Farmers and other personnel are known to newly release varieties and modern rice production technologies

BRRI Regional Station Barisal

Research Progress 2015-2016

Sl	Research Progress	Expected output
Programme area/Project with duration: Regional Station, 2015-2016		
1	**Development of Multi-trait Advance Breeding Lines for Tidal Areas** • Hybridization of Female parent BRRI dhan52 with male parent Sadamota, BR7941-41-2-2-4, BR7941-41-2-2-4 and BRRI dhan56 was done which resulted in 15, 11, 9 and 16 F1 Seeds, respectively. • Parents viz. BRRI dhan28, BRRI dhan62, BRRI dhan63, BRRI dhan72 and BRRI dhan52 as recipients and Dud Kalam (Bold Grain, Tidal Sub Tol.), Balam (Long Slander, Tidal Tol. Intermediate Plant type), Borsha (Long Slander Grain, Tall, Tidal Tol.), SP-1, JS-1, JS-2 as donor parent for hybridization were grown during Boro, 2015-16	Generate better genotypes
2	**Development of Multi-trait Advance Breeding Lines for Boro in Barisal Region** 175 plants were selected in T. Aman and grown in Boro, 2015-16 through Rapid generation advance process	Better genotypes could be used for further advancement.
3	**Development of Varieties for Tidal Submergence of T. Aman Rice** Four progenies from F_2, 90 progenies from F3, 67 progenies from F4 population, 66 fixed lines from Observational Trial and 8 entries from Secondary Yield Trial were selected	Better genotypes could be used for further advancement.
4	**Regional Yield Trial (RYT)** **RYT Aman 2015** RYT 1 (RLR):Six lines were evaluated against two standard checks. The highest yield was obtained by BR8227-6-2-1 and BRRI dhan49 (ck) (3.21 t/ha) which is higher than the other check BRRI dhan39. RYT 2(RLR): Eight lines were evaluated against two standard	Better genotypes could be used for further advancement.

Sl	Research Progress	Expected output
	checks. The highest yield was obtained by BRRI dhan49 (ck) (3.03 t/ha) which is higher than the other lines & check varieties. RYT (PQR): Ten lines were evaluated against two standard checks. The highest yield was obtained by BR8522-21-4-8 (4.02 t/ha) which is higher than the other lines & check varieties. RYT (Biotech): Six lines were evaluated against three standard checks. The highest yield was obtained by BR9782-BC2-132-1-3 (3.40 t/ha) and the lowest yield was obtained by BRRI dhan33(ck) (1.67 t/ha). **RYT Boro 2015-16** RYT_Cold: Two lines were evaluated against two standard checks. The highest yield was obtained by BR7812-19-1-6-1-P4 (4.07 t/ha) which is higher than the other line and check BRRI dhan28 (3.33 t/ha) and check BRRI dhan29 (3.32 t/ha). RYT 1_Bio (SD): Six lines were evaluated against a standard check. The highest yield was obtained by BR(BIO)9787-BC2-63-2-4 (4.40 t/ha) which was higher than the other lines and check BRRI dhan28 (3.10 t/ha). RYT 2_Bio (LD): Seven lines were evaluated against a standard check BRRI dhan29. The highest yield was obtained by BR(BIO)9787-BC2-122-1-3 (4.72 t/ha) which is higher than the other lines and check BRRI dhan29 (3.87 t/ha). RYT_Insect Res: Nine lines were evaluated against three standard checks. The highest yield was obtained by BR7903-16-10 (4.10 t/ha) which is higher than the other lines and checks. The lowest yield was obtained by BR8338-34-3-4 (3.30 t/ha) and BR8340-16-2-1 (3.30 t/ha). RYT 1_MER: Three lines were evaluated against a standard check BRRI dhan28. The highest yield was obtained by BR7831-59-1-1-4-5-1-9-P1 (4.67 t/ha) which is higher than the other lines and check BRRI dhan28 (3.96 t/ha). RYT 2_MER: Three lines were evaluated against two standard checks BRRI dhan63 and BRRI dhan29. The highest yield was obtained by BR7671-37-2-2-3-7-3-P10 (3.85 t/ha) which is higher than the other lines and checks. RYT#3_MER (LA): Three lines were evaluated against two standard checks. The highest yield was obtained by IR84839-RIL118-1-1-1-1-1 (3.80 t/ha) which is higher than the other lines and checks BRRI dhan58 (3.26 t/ha) and BRRI dhan29 (3.66 t/ha).	
5	**Proposed Variety Trial (PVT) for T. Aman rice** **PVT for submergence tolerant rice:** Two proposed varieties BR7941-116-1-2-1 and BR7961-41-2-2-2-4 gave around 1.5 t/ha higher yield than corresponding local checks Sadamota and Dudhkolom. Seedling height of these two lines was almost similar to local checks. **PVT for salt-sub tolerant rice:** Two proposed varieties	-Two lines in PVT- tidal submergence were released as two new varieties viz. BRRI dhan76 and BRRI

Sl	Research Progress	Expected output
	IR77092-B-2R-B-10 and BR9377-9-21-3B gave higher yield than standard check BRRI dhan44 **PVT(RLR,SD):** NERICA Mutant gave higher yield (2.65 t/ha)than standard check BRRI dhan57 2.40 (t/ha) **PVT(GSR):** HUA565 gave higher yield (3.95 t/ha) than standard check BRRI dhan33 (3.30 t/ha) **PVT(PQR):** BR7697-15-4-4-2-2 gave higher yield (2.54 t/ha) than standard check BRRI dhan37 (2.31 t/ha) **PVT(RLR):** BR7611-31-5-3-2 gave around 1 t/ha higher yield than standard check BR11	dhan77. -HUA565 was released as BRRI dhan75 from PVT-GSR -One variety from PVT-salt was selected for new varietal release.
6	**Screening of rice germplasms and breeding for Ufra resistance** 31 local rice germplasms (collected from Barisal) with Resistant check Royada were screened against ufra nematode of which Balam, Nakuchimota, Moulata, IM, Dudhkalam were resistant (score 1); Local aman, Komla Mota were moderately resistant (Score-3), Kachamota, Khaiya, Bhushiari balam chikon, Montesar Mota, Kamranga, Sorbi Maloti, Sakhorkhora, Barsa, sadamota moderately susceptible (score-5), Lal Paikka, Banshful, Chaolamatari, Chinikanai, Badshabhog, Lokma, Abdul Hai were Susceptible (score 7) and Chaprash, Guti swarna were Highly susceptible (score 9).	Ufra resistant line could be used to developed resistant variety
7	**Demonstration of blast disease management practices at farmers' field** About 80% disease decreased and 26-33% yield increased in Researcher's practice over farmers' practice. Disease incidence and severity were higher in Kalijira followed by Sakkhorkhora and Chinigura .	Blast management practices would be used by farmers
8	**Survey & monitoring of rice diseases** Survey was conducted at Barisal Region during 2015-16. Blast, sheath blight and false smut (later cultivated crop) were recorded as major diseases.	Database would be created in order to develop forecasting models.
9	**Performance of blast resistant multiline of IR49830 under tidal non-saline sub eco-system** No blast disease in IRBL-ta2, IRBLsh-T, IRBL9W whereas higher disease incidence was recorded in Sadamota followed by BR22 and BRRI dhan46. Highest yield was recorded in BRRI dhan46 (4.6 t/ha). Three multilines of IR49830 gave 0.7 -1.0 t/ha higher yield than local variety Sadamota (2.82t/ha).	Blast resistant multiline could be used by farmers
10	**Integrated approach on rice false smut disease management, T. Aman 2015** There was no False Smut disease in different treatments including control irrespective of time of planting and N-management.	False Smut management practices could not evaluated

Sl	Research Progress	Expected output
11	**Adoption and Demonstration of Water Saving Technologies at farmer's fields for Boro rice cultivation.** 11 demonstrations were done during **Boro, 2015-16**indifferent Upazillas of Patuakhali, Barisal and Barguna districts. On an average of 2-3 irrigation were saved and fuel cost as wellwithout compromising any yield penalty.	AWD saves irrigation water and cost
12	**Assessment of suitable water resources availability for irrigation to increase crop production in tidal areas of Barisal region** The dynamics of surface water salinity in the dry season at different locations of Barisal region were measured during April and May. A declining trend of water salinity was observed from April to May due to early monsoon.	Explore the source of suitable water for irrigation
13	**Demonstration, seed production and scaling up of MV rice in Barisal region under PGB-IADP** In Aus 2015, BRRI dhan27, BRRI dhan48 were demonstrated and bothe the varieties gave similar yield.During T. Aman 2015, BRRI dhan 52, BRRI dhan62 were demonstrated along with other varieties. BRRI dhan52 produced an average of 4.75 tha^{-1}grain yield with growth duration of 139 days. On the other hand BRRI dhan62 gave 4.35 tha^{-1} grain yield with much shorter growth duration of only 99 days.Farmers chose BRRI dhan62 due to itsshorter growth duration, zinc content and satisfactory grain yield. They also liked BRRI dhan52 as it survived after 2 weeks of tidal inundation. In Boro 2015-16, irrespective of locations average grain yield of BRRI dhan60, BRRI dhan63, BRRI dhan64 and BRRI Hybrid dhan3 were 6.18, 6.14, 6.06 and 7.67 tha^{-1}, respectively. The farmers of those localities were motivated togrow those varieties due satisfactory grain yield.	Farmers were motivated with the varieties BRRI dhan48 in Aus, BRRI dhan52 and BRRI dhan62 in Aman and, BRRI dhan60, BRRI dhan64 and BRRI Hybrid dhan3 in Boro
14	**Demonstration, seed production and scaling up of MV rice in Barisal region under IAPP** Under IAPP six block demonstrations each of 3.3 acres during Aus 2015, Ten block demonstrations each of 3.3 acres during T. Aman 2015 and eleven block demonstrations each of 3.3 acres during Boro 2015-16 were established. An average yield of BRRI dhan48 was 4.2 t/ha found over the locations in Aus season. In T. Aman 2015, average yield of BRRI dhan41, BRRI dhan44, BRRI dhan46, BRRI dhan49 and BRRI dhan52 was 4.6, 4.8, 4.3, 4.0 and 4.7 t/ha, respectively were found.During Boro 2015-16, BRRI dhan29, BRRI dhan47, BRRI dhan58, BRRI dhan59, BRRI dhan60, BRRI dhan61, BRRI dhan64 and BRRI Hybrid dhan3 gave 6.67, 5.16, 5.87, 5.59, 5.31, 5.08, 4.94 and 8.04 t/ha grain yield, respectively.	Farmers were motivated to cultivated BRRI dhan48 in Aus, BRRI dhan44, 52 and 62 in Aman, BRRI dhan 58, BRRI dhan60 and BRRI Hybrid dhan3 in Boro.
15	**Demonstration and seed support of BRRI dhan62 under HarvestPlus Project** Demonstration of BRRI dhan62 was conducted at Najirpur and Mollahat. Yield of BRRI dhan62 ranged from 3.64-5.12 t/ha. A total of 300 minikit of BRRI dhan62 weredistributed to Bhola	Farmers were motivated to cultivate Zn-rich variety BRRI dhan62

Sl	Research Progress	Expected output
	Sadar and Borhanuddin of Bhola district, Fakirhat and Mollahat of Bagerhat, Najirpur of Pirojpur and Baufol of Patuakhali, and average yield in those Upazilas were 4.02, 3.80, 3.95, 4.25, 4.60 and 4.05 t/ha, respectively.	
16	**Farmer's training under different projects** BRRI Barisal Regional Station conducted 13 farmers' training in different locations of Barisal region during the reporting period. These training programs were conducted at Barguna Sadar, Barguna(02); Nolcity, Jhalokati(02); Babuganj, Barisal(04), Barisal Sadar (01) and at Baufal, Patuakhali(01) under EQSS project; at Nazirpur, Pirojpur(02) under PGB project and one at Baufal, Patuakhali under Harvest plus project. Total 390 persons (300 males and 90 females) were trained.	Awareness for adopting improved rice cultivation technologies and accelerate the dissemination of BRRI varieties was done.
17	**Farmers' Field Day under different projects** Twelve field days were conducted under IAPP, PGB-IADP and HarvestPlus Bangladesh projects. In total more than 2400 (average of 200 in each field day) farmers, extension personnel, administrative peoples, public leaders was participated on these programs. Most of the farmers have chosen BRRI dhan48 for Aus for high yielding and no lodging at harvesting period. In Molla Hat farmers chose BRRI dhan62 for Aman season because of its early maturing (99 days) characteristic and higher yield (4.45 t/ha). BRRI hybrid 3 and BRRI dhan64 has been chosen in Nazirpur for Boro for higher yield.	Farmers showed their interest to cultivate the demonstrated varieties in the next season.
18	**ALART** **Four ALART Aman 2015** program was conducted at Barisal Sadar.. In ALART (BBR) program BRC245-4-19-2-1 gave lower (5.39 t/ha) yield than the check variety BR11 (5.68 t/ha). In ALART (Hybrid) program BRRI dhan49 gave the highest yield (4.78 t/ha) than the lines & check varieties. In ALART (MN) program the promising line BR8143-15-2-1 gave the highest yield (5.87 t/ha) than the other lines & check varieties. In ALART (RLR) program the promising line WAS 161-B-4-B-1-TGR 51 (NERICA-L-32) gave the highest yield (5.76 t/ha) than the other lines & check varieties. **Report of ALART Boro 2015-16** Five ALART program was conducted at Barisal Sadar. In ALART (FB-SD) program the check variety BRRI dhan28 gave the highest yield (5.85 t/ha) than the other line & check variety. In ALART (ME-SD) program the promising line BR(BIO)8072-AC8-1-1-3-1-1 gave the highest yield (8.29 t/ha) than the other lines & check varieties. In ALART (Hybrid) program the promising line BR1793H gave the highest yield (8.35 t/ha) than the other lines & check varieties. In ALART (GSR-LD) program the promising line HHZ15-DT4-DT1-Y1 gave the highest yield (8.02 t/ha) than the other lines & check varieties. In ALART (HY-SD) program the promising line	Better genotypes could be used for further advancement.

Sl	Research Progress	Expected output
	BRRI dhan29-SC3-28-16-15-HR2 (Com) gave the highest yield (8.48 t/ha) than the other lines & check varieties.	
19	**Hybrid seed production** Seeds of BRRI Hybrid dhan3 were produced at Sagardi Farm and at farmer's field. Produced seeds were provided to the farmers of this region to cultivate and disseminate.	BRRI released Hybrid varieties would be disseminated to farmers of Barisal region
20	**Breeder seed production** In T. Aman 2015, a total of 4939 kg (BR23=424 kg, BRRI dhan44=218 kg, BRRI dhan52=3278 kg under EQSSP and BRRI dhan44=219 kg, BRRI dhan52=800 kg under IAPP) and in Boro 2015-16, a total of 10,730 kg (BR26=4650kg BRRI dhan61=1080 kg, BRRI dhan67=1500 kg, BRRI dhan28=2000 kg, BRRI dhan29=1000 kg and BRRI dhan60=500 kg) breeder seed were produced.	BRRI released varieties would be disseminated quickly to farmers

BRRI Regional Station Sonagazi

Research Progress 2015-16

Sl. No	Research Progress	Expected output
	Programme area/ Project with duration	
1	**Effect of long-term missing element on grain yield and yield attributes of BRRI dhan41 in T. Aman 2015:** Nitrogen is the most limiting nutrient element in T. Aman rice for saline charland ecosystem.	Generation of long-term yield as well as soil fertility status in saline charland ecosystem.
2	**Effect of different nutrient combinations on grain yield and yield attributes of BRRI dhan41 in T. Aman 2015:** The soil test based nutrient dose (NPKSZn @ 97-12-7-10-3 kg/ha) along with 25% higher NPK gave statistically higher grain yield than that of control along with local farmers' practice.	Increase sustainable rice production with suitable nutrient combination.
3	**Effect of long-term missing element on grain yield of BRRI dhan29 in Boro 2015-16:** N is the most limiting nutrient element in Boro rice for saline charland ecosystem.	Generation of long-term yield as well as soil fertility status in saline charland ecosystem.

4	**Effect of different nutrient combinations on grain yield of BRRI dhan29 in Boro 2015-16:** The soil test based nutrient dose (NPKSZn @ 140-20-30-15-4 kg/ha) along with 25% higher NPK gave statistically higher grain yield than that of control along with local farmer's practice.	Increase sustainable rice production with suitable nutrient combination.
5	**Survey on indigenous rice products of BRRI varieties:** In Feni and Chittagong districts BR16 is popular for puffed rice and BR11, BRRI dhan28, Hybrid and Indian Swarna are more popular varieties for flattened rice.	Selection of Good varieties for puffed and flattened rice.
6	**Proposed variety trial:** The proposed lines, BR9377-9-21-3B, IR77092-B-2R-B-10 for tidal submergence and salinity, BR7611-31-5-3-2 for rain fed lowland, NERICA Mutant, BR7697-15-4-4-2-2 for premium quality and HUA 565 for green super rice produced better yield than their respective checks in T. Aman 2015.	Development/identification of efficient rice genotypes.

BRRI Regional Station Rajshahi

Research Progress: 2015-2016

Research Progress	Expected output
1. Survey & monitoring of rice insects and diseases Survey was conducted at Rajshahi Region during 2015-2016. Blast, sheath blight and bacterial blight were recorded as major diseases.	To create database on the occurrence and distribution of different rice insects and diseases with respect to varieties, cropping patterns, seasons, locations and environment in order to develop forecasting models. Identifying emerging insects and diseases with changed environment.
2. Variety Development Program (VDP) Two rainfed lowland rice (RLR), five swarna material, three premium quality rice material and three mincronutrient enriched rice (MER) lines were selected. Six favourable boro (FBR) rice lines found better Two cold tolerent lines found better Three insect resistant lines were selected	Better genotypes could be used for further advancement.
3. VDP/ STRASA project Three promising drought tolerant advanced lines were identified. Nine drought tolerant lines were selected for PVS function	Better genotypes could be used for further advancement.
4. VDP/ADB water saving project 10 aerobic rice lines were selected	Better genotypes could be used for

	further advancement.
5. Conservation of natural enemies through ecological engineering approaches, T. Aman 2014 Highest natural enemies and parasitism by *Trichogramma zahiri* were observed in rice field nearby nectar-rich flowering plants. However, the least natural enemies and parasitism were found in rice field where four times (continuous/ prophylactic) insecticides were applied. Moreover, there was no yield reduction in rice field surrounding by flowering plants compared with insecticide application.	It will help to avoid insecticide spraying in the early crop stages by enhancing the buildup of different natural enemies in rice eco-system.
6. Evaluatin of short duratin crop varieties under different cropping patterns BRRI dhan56-BARI sarisa 14-BRRI dhan58 found better compared with BRRI dhan62-BARI motorshuti 3-BRRI dahn28 and some other cropping patterns	Productivity and profitability of the farmers will be increased.
7. Evaluation of crop establishment methods under different tillage and crop residue management options under Rice-Wheat-Mungbean system Bed planting technology found better compared with strip tillage and conventional tillage	Profitability of the farmers will be increased.

BRRI Regional Station Satkhira

Research Progress 2015-16

Sl. No.	Programme area/ Project with duration	Expected output
Aman 2015-16		
01.	Regional Yield Trial-1 (RYT-1) Development of Rainfed Lowland Rice (RLR)	IR70213-10-CPA4-2-2-2 (t/ha) and BR8227-6-2-1 (t/ha) could be suggested for next step in variety development program.
02.	RYT-2 Development of Rainfed Lowland Rice (RLR)	BR8214-23-1-3-1 yielded (6.14 t/ha) higher than the checks (Swarna (5.99 t/ha), BRRI dhan39 (4.38 t/ha) and BRRI dhan49 (5.22 t/ha)).
03.	RYT: Development of Premium Quality Rice (PQR)	Seven entries yielded higher than checks (BRRI dhan34 and Kalijira) and all of them are suggested for next step in varietal development program.
04.	RYT: Development of Disease Resistance Rice (DR)	BR7959-14-2-1 (RTV) yielded (5.99 t/ha) higher than all the four checks.
05.		
06	RYT1: Development of long slender grain rice (LS grain)	None of the entries could beat the yield of checks.
07.	RYT2: Development of short bold grain rice (SB grain)	BR7895-4-3-3-2-3 yielded (6.00 t/ha) higher than checks BRRI dhan32 (5.96 t/ha), BRRI dhan39 (4.63 t/ha) and BR (4.16 t/ha).
08.	RYT2: Development of short bold grain rice (SB grain)	None of the entries could beat the yield of checks.

09.	Stability analysis of BRRI varieties	Among BRRI released T. Aman varieties, BR11 yielded the highest (6.23 t/ha) and seven varieties yielded higher than 5 t/ha {BR4 (5.41 t/ha), BR10 (5.47 t/ha), BRRI dhan31(5.30 t/ha), BRRI dhan33(5.26 t/ha), BRRI dhan39(5.01 t/ha), BRRI dhan40(5.15 t/ha) and BRRI dhan52(5.70 t/ha)}.
Boro 2015-16		
01.	Regional Yield Trial-1 (RYT-1) Development of Favorable Boro Rice (FBR)	BR8247-3-2-2-2 yielded (6.81 t/ha) higher than the check BRRI dhan28 (6.38 t/ha)
02.	RYT-2: Development FBR	BR8626-20-9-1-3 (7.96 t/ha), BR8626-19-5-1-2 (7.93 t/ha), BR8626-19-4-1-1 (7.67 t/ha) and BRRI dhan29-SC3-8-HR1(Com) (7.41 t/ha) yielded higher than the checks BRRI dhan58 (6.74 t/ha), BRRI dhan28 (6.86 t/ha) and BRRI dhan29 (7.11 t/ha).
Sl. No.	Programme area/ Project with duration	Expected output
03.	RYT-1: Micronutrient Enriched Rice (MER)	BR7831-59-1-1-4-5-1-9-P1 yielded (6.59 t/ha) higher than the check BRRI dhan28 (6.51 t/ha)
04.	RYT-2: MER	Tested entries (3 entries) yielded higher than the check BRRI dhan63(5.46 t/ha) but lower than the check BRRI dhan29 (7.21 t/ha).
05.	RYT-3: MER	IR84839-R1L118-1-1-1-1-1 (7.46 t/ha) yielded higher than the check BRRI dhan58 (6.60 t/ha) but lower than the check BRRI dhan29 (7.70 t/ha). Other entries are lower yielder.
06	RYT: Development of cold tolerant rice	BR7812-19-1-6-1-P2 and BR7812-19-1-6-1-P4 yielded (7.06 t/ha) higher than the check BRRI dhan28 (6.89 t/ha) but same as the check BRRI dhan29 (7.06 t/ha)
07.	RYT: Development of Premium Quality Rice (PQR)	BR8076-1-2-2-3 (6.74 t/ha) yielded higher than the check BRRI dhan50 (5.89 t/ha) and BRRI dhan63 (6.67 t/ha) where as BR7372-18-2-1HR1-HR6(Com) yielded same as BRRI dhan63.
08.	RYT for short duration rice	BR(Bio)9787-BC2-127-1-5 yielded (6.83 t/ha) higher than BRRI dhan28 (Ck.) (6.76 t/ha)
09.	RYT for long duration rice	All the entries yielded higher than BRRI dhan29 (Ck.) (7.11 t/ha). Among them BR(Bio)9786-BC2-124-1-1 yielded (7.70 t/ha) the highest.
11.	Stability analysis of BRRI varieties	BRRI hybrid dhan3 yielded the highest

		(7.18 t/ha) among 36 BRRI HYVs. other varieties (BR6, BR9, BR26, BRRI dhan28, BRRI dhan29, BRRI dhan36, BRRI dhan47, BRRI dhan59, BRRI dhan69, BRRI dhan74 and BRRI hybrid dhan2 yielded higher than 6.50 ton.
12.	Determination of nutrient requirements of Boro rice for saline gher	Found optimum fertilizer management option for Boro rice in gher land
13.	Validation of Boro rice varieties for saline gher	Data on processing
14.	Validation of Boro rice varieties for non-saline gher	Data on processing
15.	Breeder seed production: BR10, BRRI dhan28, BRRI dhan30, BRRI dhan48, BRRI dhan49, BRRI dhan50 and BRRI dhan 67	26.40 ton
16.	Truthfully Leveled Seed (TLS) production (BRRI dhan28, 50,58, 63, 67)	6.25 ton
17.	Rice production technology demonstration, seed production and dissemination	A total of 390 demonstrations were conducted during this year.
18.	Farmers' Training (FT) and Field Day (FD)	FT: 31 FD: 12

Sl. No.	Programme area/ Project with duration	Expected output
Transforming Rice Breeding (TRB)-BRRI Project		
19.	Observational Trial (OT)	18 progenies were selected
20.	Preliminary Yield Trial (PYT)-1	BR8980-3-4-1-3, BR8980-B-1-3-5, BR8992-B-18-2-26 progenies were selected
21.	Preliminary Yield Trial (PYT)-2	BR8980-4-6-5, BR8992-3-4-10 progenies were selected
22.	Preliminary Yield Trial (PYT)-3	IR 87872-7-1-1-2-1-B IR12T133 progenies were selected
Stress Tolerant Rice for Africa and South-Asian (STRASA-Salinity)		
23.	Pedigree Nursery for salt tolerance- F_2 Population	221 progenies were selected
24.	F_3	271 progenies were selected
25.	F_4	92 progenies were selected
26.	F_5	204 progenies were selected

27.	F_6	43 progenies were bulked
28.	F_7	10 progenies were bulked
International Rice of Soil Stress Tolerant Nursery (IRSSTN)		
29.	Observational Trial (OT)	15 progenies were selected
30.	Secondary Yield Trial (SYT)	IR86385-85-2-1-B progenies were selected
31.	Participatory Variety Selection (PVS)	IR86385-117-1-1-B, IR86385-183-1-1-B progenies were selected by farmers
32.	Green Super Rice (GSR) PYT-1, PYT-2	Damaged due to high salinity
33.	Green Super Rice (GSR) Secondary Yield Trial (SYT)-1	WANXIAN7777-P12 WANXIAN7777-P10 progenies were selected
Integrated Agricultural Development Project for Pirojpur-Gopalganj-Bagerhat (IADP-PGB)		
34.	Evaluation of intercropping system in tidal non saline ecosystem (2014-2017)	Musk melon intercropping with lentil in existing Lentil-Jute-T.Aman cropping pattern produced about 81% more REY.
35.	Validation of three crop systems for medium high tide wetland non-saline ecosystem (2014-2017)	Three cropped cropping pattern with potato, wheat, mustard and lentil gave 196% to 57% higher REY over Fallow-Jute-T.Aman cropping pattern.
36.	Validation of Aus based cropping pattern for medium high tide wetland non-saline ecosystem (2016-2017)	Not completed
37.	Improve productivity through rice-fish system (2016-2017)	Not completed
38.	Development of year round vegetables production practices in *Sorjan* system (2015-2017)	Vegetables production in *Sorjan* system gave 1.32 to 2.89 BCR.
39.	Adaptive trial of BRRI released rice varieties (2014-2017)	BRRI dhan52, BRRI dhan44 showed better performance in T.Aman season. BRRI hybrid dhan3, BRRI dhan60 and BRRI dhan58 gave higher yield in Boro season.
40.	Demonstration of USG application in Boro rice (2014-2017)	Using USG had some yield advantage and save total amount of urea.

BRRI Regional Station Rangpur

Research Progress, 2015-16

Sl. no.	Program/Project	Progress
1	Introducing improve cropping pattern for increasing cropping intensity and productivity in Rice-Rice system	In T. Aus season & (2015), short duration variety BRRI dhan48 gave 2.78 (T_1) and 2.85 (T_2) t/ha grain yield. In T. Aman season(2015), short duration variety BRRI dhan62 was used in both T_1 and T_2 (four crop system) and yield was 4.23 & 4.19 t/ha. In T_3 and T_4 (three crop & two crop system, respectively) common variety BR11 was used and grain yield was 6.45 & 6.42 t/ha. After T. Aman (BRRI dhan62) harvest, Potato was sown in T_1 while the yield was 25.83 t/ha. After BR11 harvest in T_3 the potato yield was 26.80 t/ha. After BRRI dhan62 harvest in T_2 Mustard was sown in T_1 while the yield was 0.93 t/ha. After Potato harvest, Mungbean was sown in T_1 while the yield was 0.61 t/ha. After Mustard harvest in T_2 the Mungbean yield was 0.71 t/ha. After Potato harvest in T_3 Maize was sown and the yield was 8.75 t/ha. After T. Aman (BR11) harvest Boro, 2016 was grown in T_4 (BRRI dhan28) and the yield was 6.21 t/ha.
2	Performance of hybrid and inbred rice at late planting situation (Braus) after potato harvest in Rangpur	It was found that BRRI dhan56 (3.55 t/ha) followed by BRRI hybrid dhan4 (2.99 t/ha) gave the highest yield in 30 July planting but BRRI hybrid dhan4 (4.62 t/ha) gave the highest yield in 15 August planting. In 30 August planting, BRRI hybrid dhan4 (5.30 t/ha) followed by BRRI dhan66 (4.57 t/ha) gave the highest yield. Among the varieties, BRRI dhan57 gave the lowest yield at all planting dates. At late Boro condition, BRRI hybrid dhan3, SL-8 & Hira gave higher grain yield at 01 March planting. BRRI dhan48 & BRRI dhan58 gave higher grain yield (5.25-5.50 t/ha) between 15-30 March planting. BRRI dhan28 gave about 5 t/ha grain yield from 1 to 30 March planting. BINA 14 gave higher grain yield at 30 March planting.
3	Evaluation of BRRI dhan48 as late Boro rice in Potato-Boro-T. Aman cropping system in medium highland irrigated ecosystem	In T. Aman season, yield of BRRI dhan57 was 4.2 t/ha. After T. Aman (BRRI dhan57) harvest, Potato was sown and yield was 33.0 t/ha. After Potato harvest Boro yield were: 1st Set: BRRI dhan28: 5.36 t/ha (30 DOS), 5.92 t/ha (40 DOS), BRRI dhan48: 7.4 t/ha (30 DOS), 7.16 t/ha (20 DOS), 2nd Set: BRRI dhan28: 8.2 t/ha (30 DOS), 8.4 t/ha (40 DOS), BRRI dhan48: 8.04 t/ha (30 DOS), 5.86 t/ha (20 DOS), 3rd

		Set: BRRI dhan28: 5.86 t/ha (30 DOS), 7.9 t/ha (40 DOS), BRRI dhan48: 7.58 t/ha (30 DOS), 8.26 t/ha (20 DOS).
4	Performance evaluation of Swarna under different fertilizer combinations	Yield was found higher in T1 (Farmers' practice: Urea-TSP-MP @ 220-60-90 kg/ha; 6.12 t/ha) than T2 (Research practice: Urea-TSP-MP-Gyp-Zn @ 180-70-90-70-10 kg/ha; 5.75 t/ha) at treatment effect Among the varieties, Swarna varieties couldn't exceed the check varieties in terms of yield but sterility percentage was distinctly higher in check varieties than Swarna varieties.
5	Effect of nutrient management and application pattern on newly developed *Sub1* genotypes	Nutrient management after de-submergence and genotype trial, treatment T2 (BRRI Recommended dose (100 kg ha^{-1} Urea + 23 kg ha^{-1} MoP) + 75 kg ha^{-1} Urea + 60 kg ha^{-1} MoP) showed the best performence among the three *Sub1* introgressed genotypes as V1 (BR9159-8-5-40-13-52), V2 (BR9159-8-5-40-14-57) and BRRI dhan52 (Res. Ck).
6	Long-term effect of three cropped cropping patterns on the agro-economic productivity and soil health (Rangpur)	In T. Aus season (2015), yield of BRRI dhan48 was 3.60 t/ha (T_3). In T. Aman season (2015) yield of BRRI dhan49 was 4.2, 4.4, 4.0 & 4.0 t/ha in T_1, T_2, T_3 & T_4 respectively. The yield of potato was 24.33 t/ha (T_1) and Maize yield was 7.42 t/ha (T_2). Mungbean was damaged (T_2) due to heavy rain. In Boro season, yield of BRRI dhan28 were 3.55 (T_1= Potato-Boro-T. Aman) & 3.37 (T_3= Boro-T. Aus-T. Aman) t/ha. In T_4 (Boro-Fallow-T. Aman) BRRI dhan29 gave 5.8 t/ha grain yield.
7	Varietal trial of newly released BRRI varieties for Boro season in Rangpur (IAPP)	BRRI dhan69 produced the highest grain yield in all locations followed by BRRI dhan60, BRRI dhan63 and BRRI dhan58. BRRI dhan58 gave the highest grain yield in Mithpukur, Rangpur and Nilphamari Sadar.
8	Dissemination of BRRI hybrid dhan3 in Rangpur, Boro 2015-16 (IAPP)	The highest grain yield was found at Rajarhat followed by Mithapukur. The lowest grain yield was found at Nilphamari because of hail-storm. In all locations, farmers have chosen BRRI hybrid dhan3, they agreed to cultivate if seeds are available in future.
9.	Dissemination of BRRI dhan58 in Rangpur, Boro 2015-16 (IAPP)	Highest grain yield was found in Dashiyer Chara (Anwar Hossain), Fulbarai compared to Badarganj, Rangpur and the lowest grain yield was found Dashiyer Chara (Ruhul Amin), Fulbari, because of neck blast. In all locations, farmers have chosen BRRI dhan58 because of higher yield and grain quality, they agree to cultivate if seeds are available in future.
10	Dissemination of BRRI dhan48 in Potato-Braus-T. Aman and Tobacco-Braus-T. Aman cropping pattern in Rangpur (IAPP)	BRRI dhan48 gave the highest grain yield in Tobacco growing area Taraganj followed by Pirgacha, the potato growing area and Aditmari, the tobacco growing area. The farmers of these locations have chosen BRRI dhan48 because of satisfactory grain yield and shorter growth duration.

11	Socio economic factors for increasing tobacco cultivation in Rangpur region	The main reasons for increasing tobacco cultivation in Rangpur are higher profit and credit on fertilizers and seed from different companies.
12	Seed production and dissemination	A total of 5.0 ton TLS and 3400 kg Breeder seed was produced during T. Aman and 6420 kg TLS and 2950 kg Breeder seed was produced during Boro season.

BRRI Regional station Bhanga

Research Progress 2015-2016

Sl. No.	Research Progress Progrmme area/Project with duration	Expected output
	Varietal Development Programme	
1.	Expt. 1. Breeding for shallow flooded Deep water rice (Hybridization)	Development of breeding lines with high yield under shallow flooded condition.
2.	Expt. 2. Breeding for developing high yielding rice varieties for single Boro cropping pattern (Hybridization)	Development of improved genotypes with high yield potential, earliness and acceptable grain quality for single Boro cropping pattern of Faridpur region.
3.	Expt.3. Regional Yiled Trials	Evaluating specific and general adaptability of the advance breeding lines as compared to standard check varieties in on-station condition
	Rice Farming System Research Programme	
4.	Expt.1. Evaluation of Aman establishment time as relay cropping with jute in Wheat-Jute-Relay Aman cropping pattern in shallow deep water rice ecosystem	Determination of appropriate time of relay cropping of short and medium long duration Aman rice variety for Wheat-Jute-Relay Aman cropping pattern
	Technology Transfer Programme	
5.	Activity 1. Scaling up BRRI released Aus varieties in Faridpur region	Increased productivity and dissemination of BRRI released Aus Varieties.
6.	Activity 2. Demonstration of modern rice varieties in Aman and Boro seasons in greater Faridpur region	Possible adoption of suitable HYVs for cultivation by the farmers
Sl. No.	Research Progress Progrmme area/Project with duration	Expected output
7.	Activity 3. Farmers' Training	Updating farmers' knowledge about modern rice production technologies

8.	Activity 4. Breeder Seed Production of BRRI dhan28 and BRRI dhan29	Being used as a source for production of Foundation Seed
9.	Activity 5. Truthfully Labeled Seed (TLS) Production of newly released rice varieties	Dissemination of newly released rice varieties for possible adoption by the farmers

BRRI Regional Station Habigang

Research progress 2015-16

Sl. No.	Research progress Programme area/project with duration	Expected output
Varietal Development		
Project I: : Deepwater rice improvement, Deepwater Aman, 2015-16		
1	Observational Trial (OT), Deepwater Rice (DWR)	Out of 6 entries, all the tested entries yielded higher (2.55 tha^{-1}-2.81 tha^{-1}) than local check Habiganj aman-I (2.45 tha^{-1}).
2	Preliminary Yield Trial (PYT), DWR	Among five tested entries, BR7730-1-1-2B yielded higher (3.10 t ha^{-1}) than Habiganj Aman-IV (2.85 t ha^{-1}).
3	Advanced Yield Trial (AYT), DWR	BR9892-6-2-2B given the highest yield (4.8 t ha^{-1}) followed by BR9392-6-2-1B (4.3 t ha^{-1}) and BR10238-5-1-B (4.2 t ha^{-1}) than the local check Habiganj Aman-I (156 cm tall & yield 2.5 t ha^{-1}).
Project II: Improvement of Transplant Aman Rice		
1	Regional Yield Trial (RYT), Micronutrient Enriched Rice (MER), T. Aman	In RYT#1, BR7528-2R-HR16-2-24-1 yielded higher (4.1 t ha^{-1}) than BRRI dhan57 (3.2 t ha^{-1}) and BINA dhan7 (3.8tha^{-1}) with 11-18 days late growth duration. In RYT#2, BR7895-4-3-3-2-3 and BR8442-9-5-2-3-B yielded higher ((4.8 t $ha^{-1}$and 5.1 t ha^{-1}) than BRRI dhan39 (4.6 t ha^{-1}) and BR5 (4.2 t ha^{-1}) with 6-13 days late growth duration. In RYT#3, BR7528-2R-HR16-12-23-P1 yielded higher (5.2 t ha^{-1}) than BRRI dhan39 (4.2 tha^{-1}) and Kataribhog (3.1 tha^{-1}) with similar growth duration.
2	Regional Yield Trial (RYT), High Yielding Rice, T. Aman	BR9786-BC2-132-1-3 and BR9786-BC2-2-1-1 yielded higher (5.0 t ha^{-1} and 4.6 t ha^{-1}) than BRRI dhan33 (4.1 t ha^{-1}) and BRRI dhan39 (4.2 t ha^{-1}) with 8-11 days late growth duration. Out of six, none of the entries yielded higher than BRRI dhan49 (5.1 t ha^{-1}).

3	Proposed Variety Trial (PVT), Rainfed Lowland Rice, T. Aman	BR7611-31-5-3-2 yielded higher (5.1 tha^{-1}) than BR11 (5.0 tha^{-1}) with 2 days early growth duration.
4	Proposed Variety Trial (PVT), RLR-Short Duration, T. Aman	NERICA mutant yielded higher (3.9 t ha^{-1}) than BRRI dhan57 (3.7 t ha^{-1}) with 3 days early growth duration.
5	Proposed Variety Trial (PVT), Premium Quality Rice, T. Aman	BR7697-15-4-4-2-2 yielded higher (5.3 t ha^{-1}) than BRRI dhan37 (3.4 t ha^{-1}) with 8 days early growth duration.
6	Proposed Variety Trial (PVT), Green Super Rice (GSR), T. Aman	HUA565 yielded higher (4.5 t ha^{-1}) than BRRI dhan33 (4.2 t ha^{-1}) with 6 days early growth duration.

Project III: Irrigated Rice (Boro)		
1	Growing of F_3 generation	A total of 176 plants for earliness and higher yield were selected in Boro season.
2	Observational trial (OT)	All the five tested entries yielded higher (6.2 t ha^{-1} - 6.5 t ha^{-1}) than BRRI dhan28 (6.0 t ha^{-1}).
3	Secondary Yield Trial-1 (SYT-1)	One tested entry BR8625-14-7-4-1 yielded similar (5.7 t ha^{-1}) to BRRI dhan28 (6.2 t ha^{-1}) with 3 days early growth duration.
4	Secondary Yield Trial (SYT-2)	Out of four, none of the entries, yielded higher than BRRI dhan28 (6.1 t ha^{-1}).
5	Advanced Yield Trial (AYT-1)	Out of four, one tested entry, NERICA L-32 yielded similar (5.9 t ha^{-1}) to BRRI dhan28 (6.1 t ha^{-1}) with longer growth duration.
6	Advanced Yield Trial (AYT-2)	Out of three, one tested entry 9392-6-2-B yielded higher (6.4 t ha^{-1}) than BR19 (6.1 t ha^{-1}) with similar growth duration.
7	RYT (HQ), Premium Quality Rice	Out of three, all the tested entries yielded higher (5.7-5.8 t ha^{-1}) than BRRI dhan50 (5.4 t ha^{-1}) but yielded similar to BRRI dhan63 (6.1 t ha^{-1}) with 3 days late growth duration.
8	RYT (HQ), Favorable Boro Rice	In RYT#1, BRH11-9-11-4-5B, BR7988-12-3-4-3-1and BR7683-30-3-3-4 yielded higher (6.9 t ha^{-1}, 6.5 t ha^{-1} & 6.5 t ha^{-1}) than BRRI dhan28 (6.1 t ha^{-1}) with 2-5 days long growth duration. In RYT#2, BRRI dhan29-SC3-28-16-15-HR2 (Com) yielded similar (7.5 t ha^{-1}) to BRRI dhan29 (7.5 t ha^{-1}) with 3 days early growth duration.
9	RYT (HQ), Micronutrient Enriched Rice	In RYT#1, out of three, none of the tested entries yielded higher than BRRI dhan28 (6.0 t ha^{-1}). In RYT#2, BR7671-37-2-2-3-7-3-P10 and BR7671-37-2-2-3-7-3-P11 yielded higher (6.5 t ha^{-1} and 6.4 t ha^{-1}) than BRRI dhan63 (6.3 t ha^{-1}) with 9-11 days long growth duration. In RYT#3, out of three, none of the tested entries yielded higher than BRRI dhan29 (7.4 t ha^{-1}) and BRRI dhan58 (7.1 t ha^{-1}).
10	RYT (HQ), Cold Tolerance Rice	Out of two, none of the tested entries yielded higher than BRRI dhan28 (5.8 t ha^{-1}) and BRRI dhan29 (7.1 t ha^{-1}).
11	RYT#1 (BIOTECH)	BR(Bio)9787-BC2-63-2-4 yielded higher (6.3 t/ ha) than BRRI dhan28 (6.0 t ha^{-1}) with 3 days late growth duration.
12	RYT#2 (BIOTECH)	BR(Bio)9786-BC2-124-1-1 yielded higher (7.5 t/ha) than BRRI dhan29 (7.4 t ha^{-1}) with similar growth duration.

Crop-Soil-Water Management		
1	Effect of Integrated Nutrient Management (INM) practices at farmers' field for increasing rice yield in Aus season.	Higher grain yield obtained with recommended chemical fertilizer dose but 2 ton cowdung/ha with 50% chemical fertilizer given similar grain yield and no need to apply excess amount of chemical fertilizer.
2	Nitrogen response of Boro advance line in rice- fallow-fallow cropping pattern.	Advanced line BRH11-9-11-4-5B given significantly higher grain yield (7.17 t/ha) at 130 kg N/ha at BRRI farm Habiganj.
3	Potassium response of Boro advance line in rice- fallow-fallow cropping pattern.	Advanced line BRH11-9-11-4-5B given highest yield (7.48 t/ha) at 80 kg K/ha followed by 7.42 t/ha grain yield at 60 kg K/ha in BRRI farm Habiganj.
4	Effect of vermicompost on Boro rice yield.	Cowdung (5.0 t/ha) or 50% cowdung with 50% chemical fertilizer given higher grain yield (6.25 and 6.62 t/ha respectively) than 1.0 t/ha vermicompost or 50% vermicompost with 50% chemical fertilizer (5.75 and 6.19 t/ha respectively). The recommended chemical fertilizer given 7.23 t/ha grain yield.
5	Fertilizer management for two high yielding premium quality rice.	High yielding premium quality rice BRRI dhan50 and BRRI dhan63 given higher yield (6.0 and 6.32 t/ha respectively) in haor areas with recommended chemical fertilizer than other fertilizer management.
6	Long-term missing element trial for diagnosing the limiting nutrient in soil.	Yield decrease was higher in N and P omission plots followed by K omission for long time (9 years).
7	Fertilizer management for two Boro advance lines **(**BRH 11-9-11-4-5B and BRH-10-3-12-21-4B) in haor ares.	The two advanced breeding lines BRH 11-9-11-4-5B and BRH-10-3-12-21-4B given higher yield (7.17 and 7.50 t/ha respectively) at recommended fertilizer dose. By increasing over fertilizer doses grain yield decreased in both the lines (5.75 and 6.59 t/ha respectively).

Rice farming system		
1	System productivity increase through rice-duck farming	Slightly higher grain yield (6.55 t/ha)) was obtained with rice-duck farming than sole rice cropping (6.25 t/ha). But rice-duck farming saved chemical fertilizer, insecticide and weeding cost.
2	Validation of double transplanting at low lying areas (Haor areas) under Boro-Fallow-Fallow cropping systems	Double transplanted rice matured earlier (7-10 days) than normal transplanted rice without sacrificing yield. It saved Boro rice from early flash-fiood in haor areas.
Socio- Economic Activities		
1	Stability analysis of BRRI released Boro varieties	The yield range of BRRI released Boro varieties was 5.5-7.8 tha^{-1}. Among the inbreed varieties, BRRI dhan29 (7.7 tha^{-1}), BRRI dhan69 (7.6 tha^{-1}), BRRI dhan58 (7.0 tha^{-1}), and BRRI dhan47 (6.7 tha^{-1}) yielded higher with the growth duration 160, 150, 152, 151, and 145 days respectively. BRRI Hybrid dhan3 (7.8 tha^{-1}) yielded higher than BRRI Hybrid dhan2 (6.7 tha^{-1}) with similar growth duration(143-144 days).

BRRI Regional station Kushtia